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The Branner Geological Library



LELAND STANFORD UNIVERSITY

MEETINGS

OF THE

ACADEMY

OF

SCIENCES.

VOLUME VII.

PART I.

APRIL 1876.

SAN FRANCISCO.



PROCEEDINGS
OF THE
CALIFORNIA ACADEMY
OF
SCIENCES.

VOLUME VII.

PART I.

Stanford Library
1876.

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УДАЛЕН ОБОЗНАЧ

PROCEEDINGS
OF THE
CALIFORNIA ACADEMY
OF
SCIENCES.

ANNUAL MEETING, JANUARY 3D, 1876.

First Vice-President in the Chair.

Thirty-seven members present.

Louis Nusbaumer and W. E. Burleigh were elected resident members.

On recommendation of the Council, Dr. Henry Gibbons, Sr. was unanimously elected an honorary life member.

In the absence of the President, First Vice-President, Henry Edwards, read the annual address as follows:

PRESIDENT'S ADDRESS.

It is a matter of regret that the coming of the New Year does not afford us the opportunity of welcoming back our worthy and respected President, who, on his return amongst us will doubtless have so much to say of the countries through which he has passed, and the many experiences which he has enjoyed. As circumstances will prolong his absence for a few weeks longer, it becomes my duty to address you on the progress which our Academy has made during the past year, and the hopes which

appear to be before us in the future. And the year which has just closed has indeed been for us an eventful one—the one from which, as it seems to me, our association will date its new life, and mark its strongest and most vigorous advancement. The Academy is poor no longer—the cloud of adversity which seemed so long to have overshadowed it, and which, but for the untiring energy and hopeful perseverance of a few of its members, would have brought its career of usefulness to a close, has, by the grand beneficence of one man, been entirely removed, and without indulging in too enthusiastic hopes, we may confidently look forward to be able to bask for the future in the sunshine of prosperity.

The change in the provisions of the Lick bequest is fresh in your recollection—a change most beneficial to us in every respect, which adds deeply to the debt of thankfulness we owe to him who has set so noble an example in the disposition of his wealth, and who has earned for all time the unbounded gratitude of lovers of science, not only in California, but throughout the whole civilized world. The property on Market Street deeded to us by Mr. Lick is now wholly in the hands of the Academy, the restrictions which existed in the former deed having been, as you are aware, entirely removed. Our annual income from this source will henceforth be in the neighborhood of \$3,800, and it is to be believed that the rapid progress which San Francisco may be expected to make in the value of her real estate, will, in a few years, considerably enhance that sum. The number of members added to our list during 1875 has been twenty-seven, of whom two were life members. Some few have resigned, and we have lost four by death, viz.: Horatio Stone, B. P. Avery, W. C. Ralston, and B. F. Sherwood. Our total number of members is now nearly five hundred, seventy-eight of whom are Life Members, so that our monthly dues, should, if faithfully paid, bring us in about \$5,500 per annum, making our total income a little over \$9,000. It is a matter of regret, however, that many of our members are sadly in arrears, and the Council for the past year recently sent out notices to the whole of those who were deficient, stating that decided action will be taken in each case before the close of the year. It was, however, afterwards thought best to give these gentlemen an opportunity to pay their dues on the day of the annual election; but I

trust that the Council chosen to-day will follow up the intention of their predecessors, and at once drop the names of drones from the roll of membership. It would, I think, be advisable that a certificate of membership should be prepared and engraved for the Academy, to be presented to each member on his reception, and, that hereafter, the names of those who are discarded from our list in consequence of the non-payment of dues should be advertised in our proceedings at the end of the year; so that no one may be allowed to sail under false colors, and reap the benefits of the labors of those who are active and honorable members of the Society.

The Report of your Treasurer, which will be given to you in detail, shows a balance in hand of \$1,593—and this, after paying for the printing of our publication of 1874, and the heavy expenses of altering this hall and supplying cases for our books and specimens. On the whole, therefore, our condition substantially is a satisfactory one; but I am able to speak in much higher terms of the scientific progress of the Academy, and the amount of work which has been accomplished. Our able director, Dr. Kellogg, has been absent for a part of the year, having been selected by the Government to make a collection of the woods of California for exhibition at the coming Centennial, which work he has most successfully performed. During his absence his place has been ably filled by Mr. W. G. W. Harford, who merits our warmest thanks for the interest he has always displayed in the Academy, and for the amount of industry he has brought to bear upon the duties of his position. We may congratulate ourselves upon his election for this year to the post of Director of the Museum.

Through the untiring energy of Mr. W. N. Lockington, nearly the whole of our Fishes, Crustacea, and Radiata, have been cleaned, identified and classified—a task which, apart from the scientific knowledge necessary for its performance, was one of very considerable labor, and a great tax on our fellow-member's time. Our collection of minerals, which now assumes considerable proportions, has been arranged and labeled by Mr. C. D. Gibbes, who has, during the past year, passed nearly the whole of his leisure time within the walls of this building. Our osteological collection, and especially our valuable series of crania, which for want of other room, are stored for the present in the basement, have been carefully cleaned, preserved and labeled, by

Dr. Stout, while our Birds have had the advantage of the supervision of Mr. F. Gruber, who promises, when cases can be found for them, to complete our series of California species and to make a MSS. catalogue of our collection, which may be published in our Transactions. To all these gentlemen whose labor has been cheerfully given, without stint and without thought of reward, the deepest gratitude of the Academy is due, and I am sure I have the authority of the members to convey thus publicly to them the expression of our truest and most hearty thanks. The donations to our collections have been both numerous and valuable—so numerous as to render it impossible for me to mention the names of all to whom we are indebted, though I cannot refrain from calling special attention to the many specimens of minerals received from various donors, including a fine set of New Zealand species, from Mr. McDevitt. Professor Eismark, of Christiana, Norway, has also enriched us by a present of European birds, Radiates and Crustacea; a fine collection of California woods has been presented by Mr. J. H. Clarke, of Mendocino; and from Dr. Burleigh we have received a valuable series of Alaskan Seals, both young and adult, in skin and in skeleton. Our corresponding member, Capt. J. H. Mortimer, has favored us with a beautiful set of pelagic Mollusca and Crustacea, including a specimen of the Portuguese Man-of-War, (*Physalia Pelagica*), most beautifully prepared, an object which, from its extreme delicacy, is rarely preserved, and therefore exceedingly scarce in museums. We have also received from various donors, large additions to our Shells, Radiates and Crustacea, all gifts having been duly and thankfully acknowledged. I trust that the importance of adding to our collection will not be lost sight of by members, and that all objects of interest which may come into their hands may be furnished to us for identification and preservation. As the whole of our treasures are gradually brought from the hiding places to which they have been too long consigned, we become more conscious of their extent and value, and the classification of the specimens which is now being proceeded with as rapidly as possible, will enable us to furnish information to those seeking it, and at the same time better display the desired genera and species of each department. It becomes, of course, a natural consequence that we should acquire duplicates of many

species, even after retaining full series in different stages of growth for the Academy's collection. To dispose of these to advantage is an object of paramount importance, and one to which the attention of the Council should be particularly directed. We especially need, to assist our already excellent collection of Crustacea, species from the Atlantic States, Europe, Africa and Australia. From the latter country and from New Guinea, we have every reason to hope for valuable contributions, and as our own Pacific Coast species are eagerly sought for by naturalists throughout the world, we may confidently expect that by a proper use of our duplicates, our number of species will, before the close of the present year, be certainly doubled. The same remark will apply in a greater or less degree to the other departments of Natural History, and I therefore urge upon all our friends, not to discard specimens because they may be thought to be common, as every one in good condition, whether existing in our series or not, is of value elsewhere, if not to us, and may be regarded as a gift of a new species to the Academy. For the proper display of our collections, however, more cases are immediately necessary, and as one of the matters most important to our interests during the present year, I urge upon the Trustees, as far as the funds at their disposal will allow, to take the subject of the display of all the materials in our possession into their serious consideration. A few hundred dollars judiciously spent now will give us case-room for some years to come, and the exhibition of our collections to the public, while it will not only assist scientific men in their investigations, will at the same time add an increased interest to our proceedings and draw from all quarters valuable contributions to our stores.

Our Library, under the able guardianship of Mr. W. J. Fisher, has considerably increased, and will shortly be rendered more accessible by a careful catalogue of every book and pamphlet upon our shelves, now being prepared by our Librarian, and intended to be subdivided into the different branches of study. We have received many important presents during the year, and I feel called upon to make special mention of the gift by our friend General D. D. Colton, of the most valuable series of Entomological works, including those of Hubner, Cramer, Drury and Stoll, all of which are profusely illustrated, and are of incalculable interest to students in that branch of science. To him;

as well as to all who have assisted us, our hearty thanks are most cheerfully offered.

The various papers which have been presented to the Academy have been of more than common interest, and will add very much to the value of our printed records. Among them I may be excused from mentioning two by our President, on the "Abrasion of the Coast of Japan," and "Probable cause of the low temperature at great depths of the Ocean." Mr. C. W. Brooks has given us precious information in his essays upon "Japanese works in American waters," and the "Commerce of Pre-historic races," while upon more special topics, we have had interesting papers from Dr. Kellogg, on the "Species of Eucalyptus," and on "Loco poison;" from Dr. Jos. Le Conte, on the "Ancient Glaciers of the Sierras;" from Mr. Amos Bowman, on the "Coal deposits of California;" from Dr. Cooper, on the "Land shells of the Coast;" from Mr. Lockington, on "Various species of Crustacea;" and from Drs. Blake and Behr, "Observations on the Phylloxera." Other matters have also been brought to your attention, to which it is hardly necessary for me to allude, as they will soon be before you in a published form, rendering the next volume of our Proceedings, in point of interest, nothing behind its predecessors.

The "Botany of California," the result of the labors of the Geological survey, will soon, through the public spirit of a few generous men, be given to the world, and it would be unbecoming in me if I did not here publicly express to Messrs. Leland Stanford, Lloyd Tevis, J. C. Flood, R. B. Woodward, Henry Pierce, D. O. Mills, Jno. O. Earl, Wm. Norris, and C. McLaughlin, the debt which all lovers of science owe to them for their noble munificence. Nor should our obligations to the scientific men who have had charge of the enterprise, and to whose knowledge of the subject we are so much indebted, be ever forgotten. Professors Asa Gray, J. D. Whitney, Watson and Brewer, have each and all devoted much time and labor to the work, and will always be entitled to the gratitude, not only of the members of this Academy, but of the future generations of scientists who may investigate the beautiful study of which they are such distinguished teachers. To Professor Gilman, also, whose absence is his gain, but our loss, we must render our thanks for the en-

* To Judge S. C. HASTINGS the gratitude of the Academy is also due, as it was owing his exertions that public attention was first called to the necessity for this publication.

terprise and ability which he displayed in advancing the publication of these much needed and deeply interesting volumes.

And here allow me to say, that it may be confidently hoped that the present session of the Legislature will take a generous and extended view of the scientific requirements of our age, and see fit to revive the Geological Survey, thus completing its previous work and bringing its former labors into active usefulness. I know that this question is viewed by different minds under different aspects, and that there are many well-meaning people in the State who will regard such a movement with disfavor. This arises partly in consequence of the want of practical value of the achievements of the survey so far as it has gone, and partly from the utter inability of some minds to appreciate the use of scientific work altogether. With the latter class it is useless to argue. Time and results alone can effect a change in them. But the former may candidly be allowed to have some just cause of complaint, the economic wealth of our State not having been, in the comprehensive views of the chief of the Survey, yet reached in the plan he had laid down; but in the future, if the government of the State should see fit to grant a sum for the continuance of the Survey, it may be entirely within its province to say for what particular ends that sum is granted. If money be given for a special purpose, it is only fair that the giver should have something to say about the carrying out of the work; and if it should be deemed that a volume on the economic geology of the State, or on the insects injurious to agriculture, would be, as suggested by the press, of more immediate and personal benefit than one on paleontology, I fail to see the unreasonableness of the demand that these subjects should at any rate be first perfected and given to the people. The rest of the work would most assuredly follow in good time, and, year by year, it is hoped that our legislators will feel more interest in the pursuits and needs of scientific culture, and that the grandeur of their schemes lies not in looking to the immediate time, but stretching in its operation far out into the future, it expands into its fullest power and conveys its perfect influence to the generations yet to come. It is, I believe, intended that the matter of the Survey will be brought on its merits before the present Legislature, and I only thus briefly allude to it here to place on record the opinion of this Academy, as the representative of the

scientific energy of this coast, and its earnest desire to see so valuable a work brought to fruition—a work which, in California more than in any other State in the Union, seems marked out as the most important educational need of the people.

It appears to me, with reference to a plan for our future work, that the course adopted by the natural history societies in the Atlantic States and Europe, may with advantage be followed here. This is the sectionizing our labors, so as to bring more determined and persistent endeavors to each individual subject, and by concentrating our energies on certain given points, be enabled to accomplish more than we can ever do while our labors are so diffused. Thus we might have a geological section, a botanical section, an entomological section, and so on, the object of each of which should be earnest and energetic work in its particular department of study, and the formation of special collections belonging to each branch. No qualifications should be required for membership in these offshoots of the general body, beyond the fact that work will be expected from all, it being of course understood that the workers in all cases shall be members of the Academy. There is abundant strength in organization, and I should suggest that a chairman and secretary should be chosen out of the members of each section, that a faithful record of all proceedings, no matter how trifling they may appear, should be kept; that the members should meet at least once a week, and that all original papers should be then first submitted, and if deemed worthy of acceptance, should be read at the fortnightly meetings, and then find a place in our proceedings. We should thus, if such a course were persistently indulged, secure an interest for the general meetings which they now rarely possess, and should make our labors of more advantage to students than they can possibly now be. There is nothing in the Constitution to prevent immediate action on this subject on the part of the members, and I think the suggestion will be found to be well worthy the attention of the Academy. It may be deemed necessary, among the several branches, to have a small weekly subscription, if only to the amount of ten cents per week, for the purchase of periodicals, apparatus, etc., without encroaching upon the general fund; but of this I do not speak authorita-

tively, as many details may yet have to be arranged, and experience will be the best teacher as to our wants.

It is agreeable to observe a change in the manner which certain journals of the city have assumed toward the Academy in their reports of its meetings. Some time since it was too much the custom to sneer at our deliberations, and attempt by some ill-judged witticisms to underrate their importance; but of late careful and respectful attention has been given to what passes here, and a more considerate tone has been taken by those representatives of the press who were once wont to assail us with unfair criticism. Science, no less than literature, aims at the elevation and refinement of mankind, and her struggles for the progress of the race should be encouraged by all who value the welfare of their fellows. And if my feeble words may reach the moneyed men of California, I would say to them that a field of benevolence is open to them, on which some of their surplus riches may be spent, which is fraught with incalculable advantages to the rising generation. I mean a thorough and scientific exploration of this most interesting country, and the collection of specimens in all branches of natural history, so that a museum of the Pacific Coast worthy of the name may find its home in San Francisco, and the riches we possess at our very doors may be brought together for preservation and for after use, instead of being now transmitted to Europe and across the continent to enrich the collections of older and wiser communities than ourselves. It is true that much has already been done by private investigation, but after all the bulk of the work remains undone. Naturalists as a class are invariably poor, and need help from their more fortunate brethren. In the single matter of Indian relics alone, the field is almost infinite, the late expedition to Southern California, under Lieutenant Wheeler, taking from the neighborhood of Santa Barbara over thirteen tons weight of these interesting memorials for exhibition at the Centennial. These will find their way into some of the museums of the Atlantic States, and be regarded as among the most valuable of their deposits, while California tamely allows herself to be deprived of objects which should surely be under her care alone. In every branch of natural history, too, the same remarks will apply. Our species have in many instances, for the want of literature or a full series of specimens, been sent elsewhere to be described, and the original types

are consequently lost to us; but with a band of workers under the sectionizing system which I have previously suggested, this may be avoided, provided the material for comparison and complete study of individual groups be placed within our reach. Hand-books of the various families in each branch of natural history could then be cheaply published, and throughout the State an impetus would be given to the study of nature which no other means can furnish. A few thousand dollars thus expended would place the givers high upon the pinnacle of fame, and hand their names down to those who shall come after us as worthy of respect and their deeds as worthy of imitation. In a community like our own, where riches seem to fall unsought into the laps of their possessors, it is well to inculcate the thought that not alone upon the battle ground of wealth can the victory of life be won; that there are triumphs purer and more abiding than worldly treasure, more powerful in their influence for humanity, than the grandest display of personal aggrandizement, and more calculated to sink deeply into the character of the coming ages, than the amassing of riches, unprofitably distributed, can ever do. Individuals have done much good in aiding the *material* progress of our State. Can some few be found to assist her *intellectual* advancement, and to make bright the toilsome path of science with the beacons of their kindly succor?

HENRY EDWARDS,

First Vice-President.

David D. Colton, President of the Board of Trustees, presented his annual report, which was read by the Secretary, as follows:

To the Trustees and Members of the California Academy of Sciences:

This being the close of the first fiscal year under the new organization of the Academy, it would seem proper for me to give a brief statement of the condition of the "temporalities" of the Academy, which by our new Constitution comes exclusively under the control of the Board of Trustees.

The Treasurer's report shows that at the commencement of the present year we had on hand \$2,900, and that the present condition of the treasury shows \$1,593.73 now on hand.

All matters in the way of expenditures have been carefully scrutinized, and the greatest economy maintained in all matters pertaining to the expenses of the Society. It will be observed that we have considerably reduced during the year the amount of cash on hand. Some purchases and expenditures connected with the alteration of the building in which we meet seemed unavoidable, and we feel certain that the improvements made as the result of this expenditure will be justified by the members of the Academy.

It is with a degree of great satisfaction that we are able to report to the Academy that we have taken possession of the munificent donation of land on Market street, in this city, from Mr. James Lick, he having given us the title, absolute in fee, to the same, which had heretofore been conditionally deeded by him with such restrictions as left grave doubts in our minds as to whether the gift would ever be of any practical utility to the Academy. The amount of rents per annum derived from the property at the time we received the same, were about \$2,300. These have been increased nearly 100 per cent., and we feel justified in the expectation that this property, for the coming year, will produce us gross about \$5,000; and from the most reliable information, taken in connection with the provisions in our favor in the last deed of trust as executed by Mr. Lick, we are warranted in the belief that this princely gift will enable the Academy to erect on the ground, within a few years, one of the most magnificent temples of science on the face of the globe.

It has been a matter of regret that we had not a more extensive fund to draw from for purposes of publication, and that so important a branch has been unavoidably curtailed for want of sufficient funds to justify publications which we have been compelled to omit. As the report of the Treasurer shows, a large number of members have defaulted in their dues. Had those payments been made, it would have materially assisted our publication fund.

It is but justice to Mr. H. M. Newhall to say, that his liberal donation during the past year of \$1,200, to be applied on the rent, has been of great assistance to us, and we feel he deserves the thanks and gratitude of the entire Academy.

To the Trustees I return my sincere thanks for their prompt attendance on all the regular and many special meetings during

the year, and for the deep interest manifested by all of them in the prosperity of the Academy, and for their jealous care and watchfulness for its best interests.

It is but justice to the Secretary, Mr. C. G. Yale, to say that for his promptness at all our meetings we are very thankful.

I remain, very respectfully, yours,

DAVID D. COLTON,
President Board of Trustees.

The Recording Secretary, Charles G. Yale, read the following annual report:

To the President and Members of the Academy:

As Recording Secretary of the Academy during the year 1875, I have simply to report what relates to new members, papers presented, and attendance at meetings.

The total attendance of members at meetings during the year has been 842, an average of 31 members at each meeting.

Twenty-seven new members have been elected, four have died, and three have resigned. The total resident membership is now 301, and the life members number 78. A list of those who became members in 1875 is appended, as well as a list of the forty-one papers read during the year, with names of authors, etc.

CHARLES G. YALE,
Recording Secretary.

Wm. J. Fisher, Librarian, presented his annual report, giving the condition of the library, as follows:

REPORT OF LIBRARIAN.

Mr. President and Members of the Academy:

During the past year our Library has received considerable additions, as well by our usual regular exchanges, as also by donations from individual members of our Society.

Especially are we indebted to our former fellow member, Professor Gilman, for a large collection of works on History and Geography, and to General D. D. Colton, for a number of very rare and costly works on Entomology.

During the latter part of the year, the Library has been removed from its former position in the gallery to its present place, and, by order of the Trustees, a number of new cases have been constructed for the accommodation of the rapidly increasing material.

I have completed the Catalogue of the works in the Library pertaining to the different scientific departments, and am now engaged in cataloguing the Proceedings received by us from sister societies.

In pursuing this work, I find a vast number of duplicates, and of works not strictly of a scientific character. A great many of these books are valuable, and I would respectfully suggest that authority be given to dispose of them, either by sale or exchange.

I also beg to call the attention of the Academy to the fact, that a considerable number of very valuable works require binding, and that by neglecting this important duty heretofore, a great many of these works have become defective.

I enclose a list of such literature as, in my opinion, should receive this attention at once, and hope that a sufficient sum will be appropriated for this purpose without delay.

A great mass of new material received by the Academy is left undescribed, for want of the proper literature, compelling us to leave to other Societies, better supplied in this respect, the honor of describing and publishing in their Proceedings, articles which otherwise would have found a space in our own Proceedings.

The following standard works, carefully selected, ought to be added to the Library as soon as possible, viz:

Ichthyology and Herpetology.

Gunther's Catalogue of Fishes; Catalogue of Apodal Fishes; Catalogue of Shield Reptiles.

Zoology.

Catalogues of Mammalia.

Crustacea.

Milne Edward's Histoire Nationale des Crustacea; Dana's Crustacea; Bate and Westwood's Brit. Sessile-eyed Crustacea; Bell's Brit. Stalk-eyed Crustacea.

Radiates.

Forbes' Brit. Star Fishes; Johnson's Brit. Zoöphytes.

Protozoans.

Bowerbank's Brit. Sponges.

Osteology.

Huxley's Elementary Atlas of Comparative Osteology.

Ornithology.

Baird, Brewer and Ridgeway's History of N. A. Birds.

Botany.

De Candolles' Prodromus.

Our Ethnological department is at present very meagre, comprising only a few pamphlets and proceedings of foreign Ethnological Societies. I would suggest that the work lately issued by our fellow townsman, Mr. H. H. Bancroft, on "The Native Races of the Pacific States," which has been very highly commended, as well by scientific men here as abroad, be secured for this department.

Very respectfully,

WM. J. FISHER,
Librarian.

The Director of the Museum, Dr. Albert Kellogg, reported on matters under his charge, as follows:

REPORT OF DIRECTOR OF THE MUSEUM.

As Director of the Museum of the California Academy of Sciences, it is but just to say, at the outset, that the improved order of arrangement witnessed by you, was inaugurated, supervised, and mainly executed, with distinguished zeal and ability, in my absence, by Mr. Harford, my improved substitute and Director *pro tem.*—of course, by and with the consent and co-operative aid of others. For my part, I candidly confess the idea of temporary occupancy had, to some extent, weakened my enterprise in the direction of pressing necessities. With this new field of space utilized, I trust we may be able to furnish it with the needed cases. If we can only provide the books and means to identify and care for collections, the men, as curators and members of all work, will see that there can be no cause of complaint at the close of 1876.

I am aware that we have little means to expend; but if our urgent wants were known, it might lead to the ways and means.

In the department of Minerals, the past year, we have received 340 donations.

Mr. Chas. D. Gibbs, whose singleness of purpose, and hearty sympathy has ever been steady to the Academy's interests, failing to arouse a proper zeal in behalf of this department, at length determined to see some system inaugurated, of more practical utility to the miner and general enquirer. While the strictly scientific arrangement of the Curator was not in any way disturbed, he has bestowed great labor and ability in sectionizing the department, according to Countries or Nations, States and Counties, thus facilitating special reference. Now, a person desirous of visiting a certain section, can seek and readily find sectional information; or, if more time is at his command, and not satisfied with this localized cabinet, he may search the general cabinet. This special system is somewhat similar to an immense promiscuous volume, well indexed, and to some extent topographically sectionized, while the other affords no such bird's eye facilities; but to execute the plan well, needs much room. With the coöperative contribution of Mining companies, only abating the merest iota of the monster specimens so zealously sent abroad, in less than a year this system could be adequately established.

We have many wealthy members offering us subscriptions for timber, bricks, and mortar, to the extent of thousands of dollars. Now, seeing this is no longer needed, why not pay a trifle—of course, selecting their own way of doing it—to such parties as they may choose to invite to their expedition, as canvassers and collectors, etc., and let them visit the mines, etc., and so be accredited for their collections, *e. g.*

This age is already deciding that the best monuments are those most useful, and such will be the wise decision of posterity.

It is high time to be preparing and arranging our cabinets for the new

building. Many of these specimens have been so long packed away, as to render the tags illegible.

Tons upon tons of minerals, fossils, and prehistoric relics, are journeying towards the rising sun, obedient to Eastern enterprise. Nor need we wish there were less, but that many might also find a home here, where scientific data are also prized; though the sacred proverb reminds us that the worthy prophets are not without honor, save in their *own* country.

Donations of *Crustaceans* during the year, are 57; *Radiates*, 21; *Fishes*, 22; *Reptiles*, 6; *Vermes*, 2; *Arachnida*, 3; *Myriapoda*, 23. Only a very remote idea of the work done, can be obtained from the Director's Catalogue of Contributions. Mr. Lockington has labored with commendable zeal, as the details of his department manifestly show. With the requisite books of reference, ten-fold more may be accomplished with a little of the toil called forth last season. We trust all such indefatigable workers will be afforded needful aid.

In the department of *Birds*, Mr. Gruber informs me, about 150 have been donated to the Academy. About one-half of the collection have been classified and catalogued, but, owing to the confusion of recent changes in the names, etc., it was deemed advisable to await American authorities, so much needed. These have been added without any cost to the Academy, which is indeed a large contribution.

In *Botany*, 120 donations. The Curator of this department has left everything *in statu quo*. Two paid curators employed a year, could not identify, classify, and poison the Herbarium, nor can we hope for any one without ample means of support, to undertake it; yet more, at least, than last season, ought to be expected.

The *Mammals*, 5 were kindly cared for by Mr. Gruber.

The donations of *Shells* amount to 69; *Insects*, 1; and *Miscellaneous*, 25.

As matters of special notice, it is due to say, that Dr. Burleigh has donated the skeleton of a seal, which, when able to set up properly, will add much to the scientific and general interest of the Academy.

Dr. A. B. Stout has also expended much labor and care in neatly cleaning and preparing a rare and varied collection of anatomical specimens for the Museum, for which the Academy are under many obligations.

Rev. E. R. Greene has also furnished us with a fine collection of well identified plants, from Colorado and the interior, which have not been distributed, and therefore do not appear in the enumerated catalogue.

It should be stated that other large and valuable collections have been received *en masse*, and not being opened, have simply passed on the list as one presentation. It would be better, hereafter, to open, enumerate, and if need be, repack such ample contributions, in order that the record may be historically more useful, and more full and just to our patrons. This was intended in all cases, but many who were competent to label and distribute them properly, having given us their promise to do so, from press of private business or other causes, failed to aid us. We trust that neither our successor, nor future contributors, may ever have any such just cause of complaint.

Respectfully submitted,

A. KELLOGG,

Director of the Museum of the California Academy of Sciences.

The Board of Trustees presented, through the Secretary, a statement in detail of the receipts and disbursements of the year, presenting vouchers of same, with monthly abstracts, checks and accompanying papers. The annual report was as follows:

ANNUAL STATEMENT OF THE BOARD OF TRUSTEES.

Amount in Bank of California, February 20th, 1875, at time	
Board of Trustees for 1875 took charge of disbursements.....	\$2,900 00
Sundry deposits to date	1,769 78
Retransferred from London and S. F. Bank to Bank of California..	1,293 00
Expenditures in Museum for cases, shelves, repairs, .	
alcohol, bottles, etc	\$ 558 55
Salaries and Commissions to Curator of Museum, Secretary of Board of Trustees, and Treasurer.....	1,021 15
Rent.....	1,650 00
Expense account, (including fuel, cleaning, etc.).....	142 40
Advertising meetings.....	32 80
Printing, (including Proceedings, blanks, checks, vouchers and abstracts, receipts, postal cards, labels and tags for Museum, engraving for Proceedings, etc.).....	679 89
Stationery and Binding.....	98 04
Freight, C. P. R. R.....	6 70
Water.....	6 00
Repairs to Building, (Gas Fixtures, Mending Roof, etc.)	132 92
Periodicals for Library.....	40 60
	<hr/>
Total Expenditures, 1875.....	4,369 05
Balance in Bank, December 31, 1875.....	1,593 73
	<hr/>
	\$5,962 78 \$5,962 78

The Trustees desire to add to this annual statement the fact, that of the above expenditures, the sum of \$819.29 was for indebtedness incurred by their predecessors in office. The details of these expenditures are as follows:

C. E. Boman, fixing shelves in Museum	\$ 129 00
Bacon & Co., printing Proceedings of 1874.....	265 55
Bacon & Co., printing Proceedings of 1874, (minus \$12 for this year's work).....	261 84
Advertising.....	21 75
Springer, (Lumber).....	11 55
Contingencies of Curator in December, 1874.....	35 50
Curtain bought for Museum.....	3 50

Periodicals furnished.....	\$40 60
Dewey & Co., Engravings for Proceedings 1874.....	50 00
	<hr/>
	\$819 29
Total this year	4,369 05
Deduct last year's Bills (1874).....	819 29
	<hr/>
Leaves as Disbursements by present Board of Trustees.....	\$3,549 76

A communication was received from the Board of Trustees, suggesting that a vote of thanks be given to certain members of the Academy for gratuitous work performed during the year. On motion, in accordance with the suggestion, a vote of thanks was passed to the following gentlemen: W. N. Lockington, W. G. W. Harford, C. D. Gibbes, W. J. Fisher and A. B. Stout.

The report of the Treasurer was read by the President, giving the amount of collections made during the year.

On motion, the reports of all the officers were accepted and ordered printed in the proceedings.

The report of judges and inspectors of election was received and accepted. A vote of thanks was passed to these gentlemen for the faithful performance of their duties.

Their report showed the following as the result of the annual election:

PRESIDENT,
GEORGE DAVIDSON.

FIRST VICE-PRESIDENT,
HENRY EDWARDS.

RECORDING SECRETARY,
CHARLES G. YALE.

SECOND VICE-PRESIDENT,
HENRY C. HYDE.

TREASURER,
EDWARD F. HALL, JR.

CORRESPONDING SECRETARY,
THEODORE A. BLAKE.

LIBRARIAN,
W. J. FISHER.

DIRECTOR OF MUSEUM,
W. G. W. HARFORD.

TRUSTEES,

D. D. COLTON,
JOHN F. MILLER,
THOS. P. MADDEN,

R. E. C. STEARNS,
WM. ASHBURNER,
GEORGE E. GRAY,

RALPH C. HARRISON.

On motion of Mr. Ashburner, the Vice-President was authorized to appoint a Committee to take into consideration the matter of sectionizing the Academy, to report at the next meeting.

REGULAR MEETING, JANUARY 17, 1876.

First Vice-President in the Chair.

Thirty members present.

Z. W. Greene and Dr. Murphy were elected resident members.

Donations to the Museum : From Henry Edwards specimens of *Sebastes nebulosus*, *Psettichthys melanostichthys*, *Sebastodes flavidus*, *Pleuronichthys marmoratus*, *Embiotica lineata*, *Metrogaster aggregatus*, *Bryllus*, sp? *Octopus punctatus*, *Lithogphagus*, sp? Also botanical specimens as follows: *Abies Pattoniana*, *Pinus flexilis*, *Pinus tuberculata*, *Pinus monticola*, *Librocedrus decurrens*. From the same donor was received a specimen of *Actinemys marmoratus*. Mr. W. G. W. Harford presented specimens of fish as follows: *Chiropsis nebulosus*, *Sebastes ruber* and an Alcyonoid polyp. Dr. R. K. Nuttall presented specimen of *Ostracion*, and Mr. W. G. Blunt five specimens of *Eutænia*. Mr. W. N. Lockington presented a specimen of *Caprella Californica*. Minerals were received as follows: From T. H. Folingsby six vials containing a number of precious garnets; one vial red and green garnets; one vial with ten specimens, supposed to contain black diamonds; one vial with quartz crystals; and one vial of green and white quartz—all from Choco, New Granada. F. A. Walley presented a specimen of *Calute* from near Martinez. Dr. Stout presented specimen of building stone from near Petaluma. From G. W. Sanders five specimens petrified wood and charcoal. From C. D. Gibbes fibrous asbestos and mica from Ruby Valley, Nev. From G. B. Merriam granite from Young's Temple, Salt Lake. From T. H. Sacket three specimens chalcedony from Temescal, Alameda County. From J. H. Mortimer bog turf, Galway, Ireland. From Henry Edwards silver ore, Panamint, Inyo Co., Cal.

C. B. Turrill read a paper by Chas. Wolcott Brooks recom-

mending a course of popular scientific lectures before the Academy. Mr. Turril read a supplementary paper on the same subject.

Henry Edwards read a paper on Pacific Coast *Lepidoptera*, No. 16.

Pacific Coast Lepidoptera.—No. 16. Notes on the Transformations of some Species of Lepidoptera, not hitherto recorded.

BY HENRY EDWARDS.

With the desire to add, little by little, to the knowledge of our species of Lepidoptera, I think it of importance to present to entomologists every observation which I am enabled to make with reference to their transformations, and though in some instances I am only able to give notes of the egg, in others, of the early larval stage, and still in others, of the more mature conditions, I regard these as of extreme value in assisting to perfect our knowledge of the life-history of each species, and as an aid to other workers who may have opportunities different from my own. As the paleontologist can, from the fragmentary portions of extinct animals, sometimes obtained from regions remote from each other, build up a complete description of the species under his consideration, so do I hope that these incomplete studies may aid the future student of the habits and history of our yet slightly known insects, and thus become the foundation upon which a better superstructure may be raised. The whole field of research in this department is yet untraversed, and will amply repay the investigator in this most interesting branch of natural science, and as before, I entreat those into whose hands examples of the early stages of any of our insects may fall, to omit no opportunity of making known to myself, or others engaged in entomological pursuits, the results of their observations.

Since the publication of my last paper on the transformations of our Lepidoptera (No. 14), the following species have come under my notice:

Family PAPILIONIDÆ.

Papilio Philenor. Fab.

Chrysalis. The usual color of this stage of Philenor has been a grayish stone color, mottled with violet and yellow; but from two caterpillars found feeding, in June last, on *Aristolochia* at Saucelito, I have obtained chrysalides so different in color, as almost to suggest another species. They are pale, but vivid, yellowish green, of a very lively tint over the whole surface, which is covered with minute blackish reticulations. The edges of the wing cases, abdominal tubercles, apex of the mesonotal process and edges of the antennæ cases rich purplish brown. Out of the same brood of thirteen caterpillars, eleven assumed the normal coloring. They all went into the chrysalis state from June 28th to July 17th.

Fam. NYMPHALIDÆ.

Limenitis eulalia. Bdv.=*Californica*. Butler.

Larva. General color, pale greenish or fawn color, becoming entirely of the latter tint when about to undergo its change. Body covered with small whitish spines. Head rather large, edged on its margins with a row of slightly branched whitish spines, each tipped with black; 2d segment constricted, without spines; 3d, 4th, 6th, 11th and 12th, each with a pair of long and branched spines, tipped with black; 7th, 8th, 9th and 10th, with shorter pair of similar spines. Below the spiracles, which are fawn color, is a darker line. Feet and legs concolorous.

Length, 1.20 inches.

Food plant, *Quercus Douglassii*, *Quercus Sonomensis*.

Chrysalis. The specimens from which my first description was taken (Proc. Cal. Acad. Sc., Vol. V, Part II) differed from the present one, in that the latter had a most beautiful pale golden blotch over the whole region of the wing cases. This chrysalis was semi-transparent, ash gray or drab, and was attached to the under side of the oak leaf by strong silken threads; the whole of the surface of the leaf being covered by the web.

Changed to chrysalis, August 20th. Imago, September 3d.

Fam. LYCÆNIDÆ.

Lycæna antægon. Bdv.

Larva. Head small; dark brown. Body dirty yellow, covered with very short downy hairs; a few black spots irregularly scattered, and a narrow greenish dorsal stripe. Spiracles, small; dark brown.

Length, 0.50 inch.

I am indebted to Dr. Behr for an opportunity of observing the larva; specimens having been found by Mr. Graham, one of Dr. Behr's students, feeding in the pods of *Astragalus*.

Fam. SPHINGIDÆ.

Deilephila daucus. Cram.=*Lineata*. Fab.

Larva. Mature. General color pale apple green. Head and 2d segment with more olivaceous tint, thickly dotted with greenish white warty spots. Mouth parts, dull yellowish. There is a bright green dorsal line, varying much in width in different individuals; sometimes merely a line, at others occupying nearly the whole dorsal surface. This is uneven at its edges, which merge into black subdorsal lines, enclosing a bright yellow streak. Both the black and yellow lines are widest anteriorly, the latter in some specimens becoming an orange patch. Posteriorly on the black lines are some small yellow dots. Caudal horn dull yellow, rough, black at the tip. Anal segment similar to the head. Spiracles orange, surrounded by a black patch, in which are some small yellow dots. Above the feet, which with the legs, are dull yellow, are some wavy black lines, occasionally obsolete.

Variety. After the fourth moult, the caterpillar sometimes, but only rarely,

assumes a very strange appearance. It becomes quite black, every trace of green being lost. The head and anal segment are then bright chestnut brown, with paler dots; while the feet and legs are dark orange. There is a faint trace of a yellow subdorsal line, and the spiracles are dark orange, with a faint lateral line below them. Between their extremes are many varieties of color.

Chrysalis. Very long and cylindrical; light chestnut brown, Tongue case wanting. Head and wing cases entirely without irrorations. Abdominal segments darker posteriorly, very rough, and dotted with darker points. Spiracles large, ovate, dark brown.

Length, 2.10 inches Width, 0.40 inch.

The caterpillar feeds on *Rumex*, *Epilobium*, *Pelargonium* and *Fuschia*. To the last named garden plants, it is extremely destructive. It is full-grown in June; changes to chrysalis from that month to the end of July, burying itself rather deeply in the ground. The perfect insect appears from August to October. It is quite common in gardens throughout this State.

Smerinthus ophthalmicus. Bdv.

Egg. Deposited separately on the food plant. Ovate, cream yellow, very smooth and shining, surrounded by a ring of lake red color. Before the exclusion of the larva, the eggs change to a pale, and afterwards to a dull greenish blue, the reddish ring being lost. Deposited, July 20th, on willows.

Young Larva. Emerged July 28th. Very pale yellowish green. Head very large, almost monstrous, and of a darker shade. Caudal horn pinkish brown, darkest at the tip. After the second moult the oblique yellow stripes make their appearance, and there is then little change save in size, until the

Mature Larva. General color pale apple green. Head rather large, truncate in front, pyramidal, the two sides of the angle broadly and distinctly edged with bright yellow, and enclosing a corrugated space, darker green than the rest of the body. Mouth parts, and feet reddish brown. The whole of the segments are marked with whitish tubercular dots. Along the sides is a narrow stripe of pale yellow, and from the 4th, 5th, 6th, 7th, 8th, 9th and 10th segments proceed some oblique yellow stripes, the 10th being the broadest, and continued to the junction of the caudal horn, which is dull sky blue, the extremity black. The anal segment is also edged with yellow. Spiracles white, edged with reddish brown. Abdominal legs, dull apple green.

Apparently double brooded, as I have taken fresh specimens of the perfect insect in February and March, while the specimens from which the above description is drawn, went into chrysalis in July, the moth emerging in the middle of September.

Fam: BOMBYCIDÆ.

Halesidota Edwardsii. Packard.

Egg. Laid in irregular clusters. Ovate, slightly flattened at the apex, and often forced out of its regular shape by a large mass being crowded into the fissure of the bark chosen as the place of deposition. Color, dull yellow, paler on the upper half, and there slightly transparent. There is no apparent sculpture, the whole surface being quite smooth and shining.

The young larvæ, which are quite black, with very long hairs, appeared on May 5th, the eggs having been deposited on April 24th. The mature form of the larvæ is described in Stretch's "Zygæinidæ and Bombycidæ of North America," page 88.

Spilosoma vestalis. Packard.

Egg. Laid in compact masses upon the food plant. Color, cream white, surface slightly wrinkled, the wrinkles when viewed through a powerful lens appearing to be a series of punctures. Eggs deposited May 15; larvæ emerged May 21st.

Young Larva. On exclusion from the egg the larvæ are dirty greenish black, with the head large, and the hairs remarkably long. After second month, the body becomes whitish green, with the head slightly pitchy. The 2d, 3d, 4th, 6th, 7th, 8th, 9th and 10th segments have four small blackish tubercles, armed with whitish spines laterally, and blackish ones dorsally. The 5th and 11th segments have still larger black tubercles. The dorsal region is darker than the sides, which generally have a yellowish tint. Feet and legs, greenish white. After the third month, the whole of the lateral hairs become bright chestnut brown, almost deep orange; those of the dorsal region darker brown, and beyond the 4th segment anteriorly, and the 10th posteriorly, the hairs of the dorsal tubercles are black; the tubercles also become hidden by the hairs. Subsequent to the fourth moult, the whole of the dorsal hairs are largely and broadly black, and the lateral series bright chestnut brown. In this condition, the larva may be readily mistaken for that of *Spilosoma acraea*.

Mature larva. Body slate black, glossy. Dorsal bunches of spines, rich velvety black; those of the lateral region, bright chestnut brown; underside, ash color. The spines are all very glossy and rich in color.

Length, 1.75 inch.

Food plant, various sp. of *Lupinus*.

The larvæ were fully fed in the early part of July, being exceedingly voracious, though able to exist for four or five days without food, and suffering no apparent inconvenience. About the 10th of the month, they began to spin cocoons, mixing up with their webs the remains of leaves and stems of their food, the whole of eleven larvæ which I carried successfully to their last stage, changing almost on the same day to the condition of chrysalis. The perfect insect is usually met with in April, and in warm seasons as early as March.

Pseudohazis eglanterina. Bdv.

Egg. Ovate, stone color, agglutinated together, and arranged in a compact mass around the stem of the food plant, generally near the extremity of the branches. The eggs are attached by their smallest end, the larvæ, escaping from the apex.

Mature Larva. Head black, shining, with a few short, brownish hairs. Body entirely dull black. Each segment is armed with six lateral spines, very finely branched, and two dorsal fascicles of spines, bright chestnut color, blackish in the centre. The branchlets of the spines are all bright

chestnut color. Underside, as well as the feet and abdominal legs, dull black.

Length, 2.00 inches.

Food plants, *Frangula Californica*, and various species of *Rosa*.

Hemileuca Nevadensis. *Stretch*.

Head shining, reddish brown. Body, pale citron yellow; 2d segment with reddish brown transverse streak, armed anteriorly with six black spines, having pale yellow branches; 3d, 4th, 5th and 6th segments, each with eight spines; 7th, 8th, 9th, 10th and 11th, have six spines each; 12th and 13th, only five, the middle one of the last being placed posteriorly to the other four. The whole of the lateral spines, as well as those of the 13th segment, are black, with pale yellow branches. Those of the dorsal pair of segments, three to eleven inclusive, are dull yellow, mottled with black, as is also the medium bunch of spines of the 12th segment, giving, when viewed without a lens, the appearance of a yellow dorsal line. There is a narrow central line of reddish brown, and each segment is also marked with transverse streaks of the same color, which, on the sides, become a broken but well defined band. Spiracles, orange, edged with reddish brown. Feet and legs also reddish brown, and segment tipped with the same color.

Length, 2.00 inches.

Food plant, Willows.

The above description is taken from one of several caterpillars, obtained in Fresno Co., Cal., by Dr. Eisen, and by him forwarded to Dr. H. Behr. In the description of the larvæ of *H. Maia Drury*, I find a notice of two reddish tubercles on each segment, which are entirely absent in the present species. In other respects they are much the same. *Maia* generally feed on oaks, while this was invariably found upon willows, and fed in confinement upon the weeping willow of the gardens.

Fam. NOCTUIDÆ.

Acronycta lepusculina. *Grote*.

Mature Larva. General color of body pale bluish green. Head a little paler. Mouth parts and prolegs deep black. Spiracles black, with whitish centre. The whole of the body is covered with very long silky white hairs, $\frac{1}{16}$ of an inch long, with some shorter black ones mingled, chiefly in the dorsal region. Abdominal legs bluish green.

Length, 1.10 inch.

Food plant, Poplars.

Changed to chrysalis July 23d; Imago, September 26th.

Draetoria erecto. *Bdv*.

Egg. Spherical, a little flattened at the poles; color, pale apple green, deeply striated, but with the striæ not reaching to the apex. Spaces between the striæ transversely rugged. Deposited separately on leaves of *Lupinus* and *Erodium*.

Fam. GEOMETRIDÆ.

Cidaria, 4-punctata. Packard.

Head and 2d segment, dull rose pink, the same color being continued broadly along the sides. In the lateral region are some small white dots. Dorsal region and underside, bright apple green, each segment tinged indistinctly with dull orange yellow. Feet and legs, dull rose pink.

Length, 1 inch.

Food plant, *Fuschia*; the stems of which plant are wonderfully mimicked in color by the caterpillar.

Chrysalis. Light brown, paler at the junction of the segments, each of which bears a transverse row of minute concolorous hairs.

Length, 0.60 inch.

Spins a very thin web on the underside of the leaf, which is slightly rolled at the edges.

Changed to chrysalis, June 25; Imago, August 4.

LIST OF SPECIES NOTICED IN THIS PAPER.

<i>Papilio Philenor</i>.....	.....Chrysalis.
<i>Limenitis Californica</i>.....	.....Larva and Chrysalis.
<i>Lycæna antægon</i>.....	.....Larva.
<i>Deilephila daucus</i>.....	.....Larva and Chrysalis.
<i>Smerinthus ophthalmicus</i>.....	.....Egg and Larva.
<i>Halesidota Edwardsii</i>.....	.....Egg.
<i>Spilosoma vestalis</i>.....	.....Egg and stages of Larvæ.
<i>Pseudohazis eglanterina</i>.....	.....Egg and Larva.
<i>Hemileuca Nevadensis</i>.....	.....Larva.
<i>Acronycta lepusculina</i>.....	.....Larva.
<i>Drasteria erecto</i>.....	.....Egg.
<i>Cidaria, 4-punctata</i>.....	.....Larva and Chrysalis.

Dr. Henry Gibbons called attention to the frequency of earthquakes in different parts of the world during the present month.

The following propositions for membership were submitted:

W. H. Hall, J. P. Curtis, H. S. Craven, C. A. Stetefeldt, W. A. Skidmore, Howard Schuyler, Alfred Poett, James D. Hague, E. B. Dorsey, Hamilton Smith, Jr., Louis Janin, Charles Barton Hill, Joel F. Lightner.

On motion of Mr. Stearns, the Vice-President was authorized to appoint a committee of ten to confer with the Committee of the Art Association upon the subject of the obsequies of the late Benjamin Parke Avery.

The Committee appointed in the matter of sectionizing the

Academy, presented their report in the form of a preamble and resolutions, as follows:

To the California Academy of Sciences :

The Special Committee in the matter of Sectionizing the Academy, which was appointed at the last meeting, herewith present their Report, in the form of a Preamble and Resolutions, and respectfully request your favorable consideration.

WHEREAS, In many Scientific Societies, experience has proven that the objects for which such societies were founded and organized, namely, the advancement of Science and the diffusion of knowledge, have been promoted by the formation of sections for the pursuance of special studies and investigations, and as it is believed by many members that the formation of sections inside of the California Academy of Sciences will increase the usefulness of this Academy, and many of its members desire to form such sections, it is hereby

Resolved, That it is the sense of this Academy, that the objects for which it was founded will be advanced by the formation of sections, which may include such members as are pursuing special departments of scientific investigation and study, and as many members have expressed a desire to form sections in order to facilitate such investigations and studies, it is hereby provided that sections may be formed, and in the following manner, and under the restrictions herein contained.

Whenever not less than five members of the Academy shall unite to form a section, they shall have the right to do so, but shall first submit to the Council of the Academy, a written communication, signed by the members who propose to form such section, stating the department of science or the character of the investigation or study which it is intended the section shall pursue; but no section shall be considered as formed or be recognized by the Academy, until due notification thereof, which shall be made to the Academy by the President or the Recording Secretary, or in the absence of said officers, by some other member of the Council, at the first regular meeting of the Academy after or following the receipt of the communication from the members proposing to form such section.

And upon and after such notice at a regular meeting as above, such section shall be considered as established, and a written notice of the same shall be posted in a conspicuous place in the hall of the Academy, and the members of the latter shall have the right to attend the meetings of the section so formed. Persons not members of the Academy shall not be members of any section.

Sections formed as above, may make such by-laws as are deemed necessary, and the members thereof shall have the power to manage the affairs of the section to which they belong, and only the members of a section shall have the right to vote upon matters pertaining to the section to which they belong.

Provided, however, that no by-law or regulation made by any section shall conflict with the Constitution or By-Laws of the Academy.

If at any time it shall be found that the action of any section is detrimental

to the interests or objects of the Academy, or that any section through the apathy or dissensions of its members, shall cease to pursue or carry out the objects for which it was formed, or for any other good and sufficient cause, then the Academy may suspend or abolish such section by a two-thirds vote of the members present at any regular meeting, and any section so suspended or abolished shall not be continued or restored except upon the recommendation of the Council at a regular meeting of the Academy, and by a two-thirds vote of the members present.

Any and all property acquired by any section, shall be the property of the Academy, but may be segregated and kept apart from the general property of the Academy, for the special use of the members of the section to which it belongs, so long as such section may exist, but upon the dissolution or abolishment of any section, then the same shall be merged in the general property of the Academy.

A notice of the meeting of any section shall be posted in a conspicuous place in the Hall of the Academy, or announced at any regular meeting of the latter, but no meetings of any section shall be held during the hours or period of any meeting of the Academy, but at such other time as may be found convenient to the sections, and may be held in such rooms in the building of the Academy as may be available.

All of which is respectfully submitted,

ROBT. E. C. STEARNS,
A. KELLOGG,
WM. ASHBURNER,
HENRY EDWARDS,

Special Committee.

SAN FRANCISCO, January 7, 1876.

On motion of Mr. Scupham, the Report was adopted, and the Secretary instructed to spread the Preamble and Resolutions on the records, for future reference.

The Committee was continued, to aid in organizing the sections.

REGULAR MEETING, FEBRUARY 7th, 1876.

Second Vice-President in the Chair.

Twenty-one members present.

In the absence of the Secretary, W. J. Fisher was elected Secretary *pro tem*.

The following new members were elected:

C. L. Scudder, W. J. Graves, Samuel Purnell, Joseph Tilden,
G. L. Lansing, Dr. R. K. Nuttall, Dr. J. T. Crook.

The following propositions for membership were submitted:
S. Lubeck, life member; T. Bechtinger, resident member.

Donations to the Museum: Prof. Geo. Davidson presented the following: Rye from the Russian shores of the Baltic, plant and seed from Japan, cherry and apricot stones from Rome and Naples, Lupine seeds from Pompeii, Persian violet, cotton ball from Elephanta, Bombay, seed from India, *Casuarina Equisiti folia* (India), tree seed from Bombay, tobacco from the Nile, seed, orange seeds from Joppa, corn from the Nile (fourteen parcels in all), shell money, *cypræa moneta* (India), seven parcels of insects from India, Egypt and Italy, wheat from the valley of the Nile. From Henry Hemphill, the following Crustacea: *Cancer antennarius*, three specimens; *C. productus*, one; *Xantho spinituberculatus* (n. s.), one; *X. novemdentatus* (n. s.), one; *Xanthodes latimanus* (n. s.), one; *X. leucomanus* (n. s.), five; *X. Hemphilliana* (n. s.), one; *Speocarcinus, Californiensis* (n. s.); *Randalia ornata*; *Lupa bellicosa*; *Acanthus spino-hirsutus* (n. s.); *Dermaturus Mandtii*; *Microrhynchus Hemphillii* (n. s.); *Inachus tuberculatus* (n. s.); *Fabia subquadrata*, two; *Pugettia Richii*; *Pisoides tumidus* (n. s.); *Pseudosquilla marmorata* (n. s.), one; *Alpheus equidactylus* (n. s.), one; *A. bellimanus* (n. s.), two; *Hippolyte palpator*, one; *H. cristata*, one; *H. Hemphillii* (n. s.), one; *Idotea rectilinea* (n. s.), one; *Labrus frons-acutis* (n. s.); *Scyra acutifrons*; *Crangon nigromaculatus* (n. s.), two; *Callinassa longimana*. From Henry Edwards, *Panulirus interruptus*, *Idotea resicata*, *Hippolyte lineata*, *Acalephæ*, *Amblystoma*, *Sceloporus*, *Gasterosteus*, *Chiropsis guttatus*, *Orchestia Traskiana*, *Livoneca vulgaris*. From Mr. Curtis, through C. M. Kinne, *Ostracion*, sp? From the California Pioneers, one hundred and fifty specimens of ores and minerals. From Henry Edwards, precious garnet in mica slate. From W. N. Lockington, Sillimanite. From J. F. Jerome, minerals and ores. From Gov. S. Purdy, silver ore. From Holmes and Dawson, specimens of marble. From Prof. Davidson, *leucite* (white garnet). Ivory and palm nuts from the California Pioneers.

W. N. Lockington read the following description of twenty new species of Crustacea from California:

Remarks on the Crustacea of the Pacific Coast, with descriptions of some New Species.

BY W. N. LOCKINGTON.

Notwithstanding the small number of sheltered bays and coves to be found along the shores of the Pacific Ocean, south of Vancouver's Island, the Crustacea appear to be tolerably abundant, since the total number of species of the two highest orders, (the stalk-eyed and sessile-eyed) known or described up to this date, is about two hundred and twenty, and there is every reason to believe that a more searching investigation would at least double that number.

Neither Dana nor Stimpson did much work at the Crustacea south of San Francisco, and the species lately described by Smith are almost entirely from Panama. Between Panama and San Francisco lies a vast extent of coast, extending through nearly twenty-nine degrees of latitude, and embracing a region greatly diversified in climate and productions, so that although many San Franciscan species extend southward a considerable distance, and many Panama species may range along Central America, it is but reasonable to suppose that many undescribed forms have their limits between those extremes.

The reasonableness of this expectation will be rendered the more apparent by a glance at a map showing the ocean temperature. That portion of the ocean bathing the shores of California at San Francisco, belongs to the sub-temperate oceanic zone included between the isothermal lines of 50° Fahr. and 56° lowest cold, but the heat of the ocean increases rapidly as we travel southward, so that the coast from Monterey to San Diego, and for some distance south of the latter place, lies between the isothermal line of 56° extreme cold and that of 62°. The greater part of Lower California, with the Gulf, is included within the line of 62° extreme cold and that of 68°, and may be called warm temperate. From Cape St. Lucas to about the latitude of Acapulco is the sub-torrid zone, the isothermal line of 74° degrees lowest cold bounding it toward the south, and forming the northern limit of the torrid oceanic zone which extends to, or near to, Guayaquil, in the State of Ecuador.

Since Panama is situated close to the oceanic heat equator, it will be seen that in the 29° of latitude between San Francisco and that place there is a variation of about 30° in the lowest temperature of the ocean, a difference which must and does imply a corresponding variation in the animal life inhabiting the ocean.

It was, therefore, with great pleasure that I received, since our last meeting, a small but choice collection of Crustacea, collected at Monterey and San Diego, by Mr. Henry Hemphill, and my pleasure was still greater when I found, upon comparison with the specimens already in our museum, and with the writings of Stimpson and S. I. Smith, that this donation enriched us with at least 20 species new to science.

Up to this present time no species of Crustacea from Panama, and only one or two from the coast intervening between that point and San Diego,

have reached this Academy, and the amount of zoölogical riches yet remaining to be harvested in this quarter, may be guessed at from the fact that these twenty species were collected incidentally, as it were, the Crustacea not being the chosen field of the collector.

It is with some diffidence that I refer some of these species to their genera, simply because we have not in our collection specimens of many well known genera, nor have we in our defective library any figures or description of the already known species included in them.

To make clear to others the difficulty under which I and any other person who attempts to do a little original work in connection with this institution, are compelled to labor, I have but to state that two of the species described in this paper belong to a group of crabs, the *macropodidae* (distinguished by the great length and thinness of their legs), no species of which has before been known on this coast, but of which the typical forms are described and figured in such standard works as those of Milne Edwards, and Bell's British Stalk-eyed Crustacea, neither of which works are to be found in our library.

I have, therefore, in determining the genera, been compelled to be guided alone by the generic descriptions given by Dana in his Crustacea of U. S. Exploring Expedition, the only comprehensive work accessible to me, and that is lent to the Academy.

Before proceeding to the technical description of the new species, I wish to draw the attention of all members of the Academy at all interested in zoölogy, to a few peculiarities in our list of native Crustacea as it stands at present.

Two species of *Macropodidae*, as I have just said, are all that are yet known. The crabs of this tribe are sluggish in their habits and are usually found among sea weed, sponges and zoöphytes, at depths below those left bare at the lowest low tide, and are thus only obtained by dredging, unless cast ashore in some storm along with the sea weed among which they live. It is, therefore, almost a certainty that a properly organized search would disclose several other species, even in this immediate neighborhood.

Of the *Xanthidae*, a sub-family near the true *cancer*, not a single species has been described by Stimpson or Dana, and it is singular that among the newly found San Diego species this tribe predominates.

Only two species of the swimming crabs (*Portunidae*), have yet been found in California, one of these (*Lupa bellicosa*), has been described by Stimpson, and the other is new.

The parasitic Crustacea of various orders have not yet been collected with any thoroughness, but I may here mention that several, (so far as I am aware) undescribed forms have recently been added to our collection, and that I hope, during the course of this year, to be able to prepare another paper upon them and upon other undescribed species not included in the present paper.

Neither the Entomostraca, which include the *Cyclops*, *Cypris*, *Daphnis*, and many other tribes, nor the Barnacles or Cirripedia of this coast have yet been studied, and I trust that this short enumeration of a few of the things that want doing may stir up some of our members to do them.

The collection of Crustacea in this museum now includes about 320 species, almost all from this coast or from the islands of the Pacific. Scarcely any

European or Atlantic coast species, and none from South America, Australia or Africa, have yet reached us.

I have purposely made my technical descriptions short, giving only those salient characteristics which distinguish the species, but it is my hope to supplement these descriptions by a series of photographs of the new forms—a hope warranted by the present financially satisfactory state of this institution.

Inachus tuberculatus.

Rostrum, short, entire; pre-orbital spine marked only by the angle of the orbit; post-orbital spine slightly longer than the eyes; medial region of carapace with several small tubercles; posterior, with a large central tubercle surrounded by a ring of smaller tubercles; postero-lateral regions, with several small tubercles; all the regions prominent and separated by well marked depressions; three last joints of first pair of feet with scattered tubercles, manus stout; second pair of legs $2\frac{1}{2}$ times the length of the post-rostral part of the carapace; sternum and abdomen with scattered tubercles.

Dimensions of two specimens:

	Length.	Width.	Length of 2d pair.
Male.....	0.75	0.55	1.55
Female.....	0.56	0.38	0.94

Dredged in eight fathoms, upon a rocky bottom covered with weeds, at the mouth of San Diego Bay, by Henry Hemphill. This, and the following species, are the first examples of the *macropodidae* found on the California coast.

Microhynchus Hemphillii.

Rostrum, short, entire; form of carapace, long and narrow triangular; post-orbital spine, small; antero-lateral margin marked by a line of hairs; 1st pair of legs short, the meros extending to the line of the eyes; 2d pair, more than three times the length of the post-rostral part of carapace; 3d, 4th, and 5th pairs diminishing in length, the last a little less than twice the length of post-rostral part of carapace. A few scattered hairs on the two last joints of the four hinder pairs of legs, especially on the fourth joint.

A single male specimen of this species was dredged, in seven fathoms of water, in the Bay of San Diego. Length, 0.75; width, 0.33; length of 2d pair of legs almost two inches.

Pisoides? tumidus.

Rostrum, bifid, moderately long; no pre-orbital spine; post-orbital spine small; first joint of external antennae very wide, prolonged into a point externally. 1st and 2d pair of legs about equal in length; hand of first pair, stoutish; fingers gaping when closed, the ends toothed and fitting neatly together; a large tubercle on movable finger in the centre of the gaping part. Carapace, with the regions tumid and spineless, smooth and rounded behind. A single specimen, male, was found between tides, near San Diego. The whole of the carapace and feet are covered with a short pubescence, becoming

longer upon the margins of the limbs and forming a lamellate protuberance over the rostrum. Length, 0.65; width, 0.45; length of 2d pair of feet, 0.80.

Lamirus ferox-acutis.

Carapace, transverse, somewhat pentagonal, each antero-lateral border having a rounded angle in the centre of its length; and the postero-lateral border forming an almost straight line with the posterior border. Rostrum, pointed, prominent, elevated, continuous with the elevated gastric region. A prominence at the cardiac region. Branchial regions prominent, each capped with a line of tubercles extending outward to the angle between antero and postero-lateral borders. Antero-lateral border finely toothed and terminating behind in an acute point. The portions of the carapace between the prominences are much depressed and perfectly smooth. Arm, carpus and hand of the first pair of legs, trigonal in section, each angle set with a continuous row of small tubercles. Dactylos turned inwards almost perpendicularly to the hand, very small. A single dried specimen brought from Santa Catalina. Length, 0.50; breadth, 0.70; breadth across arms when bent, 1.33 inch.

Xantho spinis-tuberculatus.

Front four-lobed, areolets of anterior and antero-lateral portions of carapace prominent; six teeth on antero-lateral margin, including that of posterior angle of orbit; chelipeds covered with smooth shining tubercles on the upper portions, those of the hand arranged in seven longitudinal series; fourth and fifth joints of the four hinder pairs of limbs beset with spines on their superior portions.

Specimens from Santa Rosa, presented and collected by W. G. W. Harford.

Specimens from Monterey, presented and collected by J. G. Cooper.

Specimens from San Diego, presented and collected by Henry Hemphill.

Length of carapace of male, 0.44 width, 0.63

“ “ female, 0.38 “ 0.57

Xanthodes latimanus.

Front sinuate, the inner angle of the orbit raised into a point; carapax but slightly transverse; teeth N. T. 8., prominent and pointed, D and E almost obsolete. Areolation of medial and antero-lateral regions distinct, the former having the parts 2 M, and 3 M entirely outlined. Hands, sub-equal, the right somewhat the larger; movable fingers very long, and curved abruptly downward; margin of manus continuous with the broad base of the fixed finger so as to form a sinuous sloping line; hinder feet compressed. This species may be readily identified by the delicate marbling of the carapace and chelipeds, and the downward bend of the movable fingers. Abdomen of male, five jointed.

A single male specimen from San Diego. Length, 0.73; breadth, 0.96.

Xanthodes Hemphilli.

Front almost entire, slightly waved and somewhat produced; carapace, transverse, medial region prominently outlined; 1st antero-lateral tooth (D),

almost obsolete; 2d, (E), long and low; 3d, (N), 4th, (T) and 5th, (S), pyramidal and pointed; cardiac region faintly outlined. 1st pair of feet, subequal, smooth; hands without crests or tubercles; fingers, black. The movable finger of the right hand with a large tubercle at base; 3d, 4th and 5th joints of four posterior pairs of feet compressed, fingers villous.

A single male specimen found at Monterey. Length, 0.82; width, 1.10.

Xanthodes leucomanus.

This species appears to be very nearly allied to *X. Hemphilli*, having the front antero-lateral teeth, and areolation of that species. If there is any value in the subdivision *Xanthodes*, both should be included in it, as both have the first antennal joint connected with the front by a process. The principal difference between the two forms, size excepted, will be found in the network of raised lines upon the upper portions of the hand and carpus of the chelipeds in the present form; and the almost entire absence of the tomentosity upon the four hinder pair, which characterizes *X. Hemphilli*. The dactyli of the chelipeds are of a shining, leucous tint when recent. Several specimens, from Santa Rosa Island (W. G. W. Harford); Monterey (J. G. Cooper); and San Diego (Mr. Henry Hemphill). The carapax of the largest specimen measures half an inch in width, and 0.34 in length.

Xanthodes ? novem-dentatus.

Front rather narrow, prominent in centre, and produced forwards; teeth of antero-lateral margin, nine in number; carapace transverse; chelipeds long, the right considerably the larger; manus long and rather narrow, with a slight double crest on the superior margin; corpus with several blunt spines; posterior feet somewhat compressed, with a few scattered hairs on the margins.

A single male specimen, from San Diego. Total length, 0.94; breadth, 1.25.

Acanthus. Nov. gen.

This genus is proposed for the reception of a singular species found at San Diego by Mr. Henry Hemphill. Its characters are: front, two-lobed, with a deep central emargination; antero-lateral margin, front, and whole circumference of orbit surrounded by long spines; carapax, narrow; antero-lateral and postero-lateral margins about equal in length; body, thick; abdomen of male, seven jointed. This genus appears to be near *Pilumnus*, but I can detect no trace of a prelabial ridge.

Acanthus spino-hirsutus.

Besides the generic characters given above, this species may be distinguished by ten spines upon the front, pointing straight forward; a group of four on each side the central emargination, and a single spine close to the outer antenna, the second joint of which reaches nearly to its extremity; six or seven spines on lower margin of orbit, and four larger spines on antero-lateral margin of carapax, besides those on upper margin of orbit. Front portion of carapace and upper parts of all the feet thickly covered with

long stiff hairs, mixed, on the chelipeds only, with spines similar to those of the front of carapace. The whole upper surface of the carapax, the meros of the fifth pair of feet, and the posterior portion of the sternum are covered with a short and thick pubescence. Right hand considerably the larger; fingers of both hands with several large, blunt teeth or tubercles on their inner margin. The spines upon the hands change gradually to tubercles as they approach the fingers.

Length, one inch; breadth of carapace, 1.12.

Eucrate? Californiensis.

Surface of carapace smooth, very slightly granulate close to margins; antero-lateral margin three-toothed; carapace level transversely, but considerably curved longitudinally; abdomen of male five-jointed; right hand considerably larger than the left; hand broad and thin; laminate on superior margin; carpus with a spine on the interior distal margin; four hinder pairs of legs rounded, tarsi pointed.

The aspect of this species is exactly that of Stimpson's *Speocarcinus Carolinensis*, as figured in Notes on North American Crustacea, No. 1, but the abdomen is different.

Width, 1.06 inch; length, 0.82 inch.

The only specimen (dried) is from San Diego.

Pseudosquilla marmorata.

Carapace much narrowed in front, as in *Squilla*, but the body stiff and without carinae upon the thoracic or abdominal segments, except upon the two last. Penultimate segment with two central spines flanked on each side by two lateral ones; a central carina, and five lateral ones on each side of the apical segment of abdomen. The central carina terminates in a spine, flanked just beneath by the two movable spines, counting from which, on each side are, 1st, a small blunt spine; 2d, a small acute spine; 3d, a large acute spine; 4th, a very small acute one; and 5th, a bluntish spine formed by the union of the two outermost carinae of the last abdominal segment; the penult joint of the caudal appendages armed with nine spines, the last as long as the last joint of those appendages; first joint of caudal appendages prolonged backwards into a spine almost as long as the remaining two joints, and armed on its inner edge with two strong spines; antennary plate produced into an acicular spine, movable finger with two spines only on its interior edge; three movable spines at proximal end of manus.

The whole of the upper surface of this rare and beautiful crustacean is marbled, in its dry state, with yellowish brown spots on a dark brown ground, while the tips of the caudal appendages are a vivid red.

Length, from tip of rostrum to tip of movable spines, 3.80 inches; of carapace only, 0.82 inch; width of abdomen, 0.63 inch.

This single specimen in this collection was found at low tide, on sandy mud flats at San Diego.

This and *Squilla De-saussurei*, Stimpson, are, so far as I am aware, the only Stomapoda yet discovered on the shores of California.

Crangon nigromaculata.

Carapace with a single spine on the gastric region near the rostrum, and a larger spine on each hepatic region. Suborbital and antennal spines present. Inner antennæ about equal in length to movable scale of outer antennæ, and the base of outer antennæ about half as long as its movable scale; Dactylos of first pair of feet transverse, short; an oval black spot on each side of the abdomen just anterior to the caudal processes.

Three specimens from San Diego, dredged in six fathoms of water.

Total length of largest specimen from tip of antennal scale to tip of tail, $2\frac{1}{2}$ inches; of body from tip of rostrum, 2.06 inches.

This species can readily be distinguished from all others by the black spot upon each side of the tail: it appears to be nearly allied to *C. nigricauda*.—Stimpson.

Crangon Alaskensis.

Rostrum very short and pointed: spines of carapace, as in *nigromaculata*: inner antennæ scarcely as long as movable scale of outer antennæ; movable finger of first pair of legs rather long, oblique; hands, carapace, and abdomen in preserved specimens (alcoholic), clothed with minute black spots.

This species may be distinguished from *C. nigricauda*, which it much resembles, by the greater obliquity of the palm of the hand, the different coloration, and the smaller size.

Length of body, 1.45 inches.

Several specimens from Mutiny Bay, Alaska, presented by the U. S. Coast Survey.

Alpheus bellimanus.

At the time of the publication of Stimpson's Crustacea and Echinodermata of the Pacific Shores, no species of *Alpheus* had been detected in California, but recently two species have been collected by Mr. Henry Hemphill, of San Diego. The present species may be easily recognized by the beautiful coloring of its hands, which, in a dried specimen, are orange, with various spots and workings of black and white.

Movable finger of larger hand small, depressed, and closing in a plane oblique to that of the manus, which is furnished with a spine on its outer edge, and a second beneath, has a toothed margin opposed to that of the dactylos, and presents two longitudinal grooves on its under surface, the anterior groove terminating in a transverse depression; in the smaller hand the dactylos is laminate and in the same plane with the hand, which has an exterior spine like that of larger hand, and another on its inferior surface. The fixed finger of the larger hand is longitudinal, and has an almost straight edge; the annulations of the carpus of second pair are only four in number; there is no tooth on the lower apex of the third joint of the third and fourth pairs of legs.

Two specimens from San Diego, found among kelp.

Length of larger specimen, from joint of rostrum to end of abdomen, 1.20 inches; length of larger hand, half an inch, of smaller, 0.38.

The carapace presents traces of a similar coloration to that of the hands.

Alpheus equidactylus.

A single dried specimen, broken, from Monterey, is all that we possess of this very distinct species. The larger hand has a transverse sulcus immediately posterior to the finger, and the movable and fixed fingers are of equal length and extended in the same place with the hand. The rostrum is narrow and sharp.

Length, 0.75 inch. The fingers of the chelae shut close together when the hand is closed.

Betæus longidactylus.

Form much more compressed than in *alpheus bellimanus*; hands similar in form; long and compressed; the fixed finger half the length of the hand, the movable one more than half that length; the fingers when closed gape widely; both are pointed at the end, and the points cross each other like the mandibles of a *Loxia*. At the origin of the movable finger are several teeth, opposed to two large ones upon the hand itself, which also bears a large tooth in the centre of the length of the fixed finger.

Color of carapace of dried specimen, green, with nuances of russet and olive. The fingers of the larger hand are light red, the tips green.

Length of carapace, 1.12 inch; of larger hand, 0.56 inch; of smaller, 0.36 in.

A single specimen from San Diego, on a sandy mud flat, between tides.

Hippolyte? Hemphilli.

I give this provisional name to a single specimen (dried), brought from San Diego by Henry Hemphill. Several of the feet are wanting, and the specimen is distorted so as to render a detailed description impossible. The rostrum is short and has four teeth, besides the long terminal tooth. The limbs are banded transversely with alternate dark and light tints.

Length, 1 inch.

Hippolyte lineata.

Rostrum less than half the length of the carapace, armed with seven teeth on the upper side (including the terminal one), and three on the lower; the two hinder teeth only are on the carapace, and are longer, but not higher than the others; outer maxillipeds reaching to the tip of the movable scale of outer antennæ; hands of first pair small and slender. The most noticeable characteristic of this species is the presence of eight longitudinal lines of a tint lighter than the ground color of the body. Upon the carapace these eight lines become broken up, and mingled with other markings, producing a pattern resembling that of watered silk. Two dried specimens from San Diego, collected between tides, and one larger one, in alcohol, presented by Henry Edwards.

Length of largest specimen, from tip of rostrum to end of abdomen, $2\frac{1}{2}$ inches.

Idotea rectilinea.

Body, slender; not increasing in width backwards; all the segments of the thorax equal in width, and the abdomen rectilinear, nearly as wide as the thorax; first two segments of abdomen, distinct; total length of abdomen about equal to that of last three thoracic segments; posterior extremity obtusely pointed. Thoracic segments equal in length. Outer antennae, long; the peduncle equal in length to the three first segments of body; flagellum broken in both specimens. Color, various; one dried specimen almost entirely black, the other with a black line down centre of body, the rest of which is yellowish.

Length, 0.80 inch. Width, 0.17 inch. San Diego.

Serolis carinatus.

Thorax and abdomen conspicuously keeled upon the centre of every segment; the first segment slightly waved on its posterior margin, the curve of the segments increasing rapidly, in such a manner that the last entirely encloses the free abdominal segments on their sides. Caudal segment rounded at the extremity, with two marginal teeth on each side, at a considerable distance from the extremity, the central carina running the entire length of the segment; last basal joint of inner antennae longer than the flagellum; flagellum of outer antennae much shorter than either of the two of the preceding basal joints, and last basal joint about equal in length to the penultimate. Eyes large, reniform, conspicuous. The texture of the upper surface of a dried specimen, under a two-thirds power, has a somewhat squamate appearance. Color, a grayish brown, diversified with dots and irregular markings of black; hands long and slender; dactylos equal in length to the manus. Two specimens from San Diego. Length, 0.21 inches; width, 0.16 inches.

T. A. Blake read portions of a petition to Congress, from the Boston Society of Civil Engineers, relating to the adoption of the Metric system of weights and measures.

On motion, the Chair was requested to appoint a committee in regard to the memorial.

The Vice-President informed the Academy that Dr. Gerhard Rohlfs had kindly consented to lecture before the Academy upon his travels in Africa during the years 1860 and 1867; the lecture to be delivered the Monday following this announcement.

On motion of Dr. Stout, Dr. Rohlfs was invited to become the guest of the Academy during his stay in San Francisco.

The judges of election reported having duly filed the certificate of election with the County Clerk.

REGULAR MEETING, FEBRUARY 21, 1876.

In the absence of the President and Vice-Presidents, Dr. Henry Gibbons was called to the Chair.

Nineteen members present.

Chas. F. Dio Hastings was proposed as a life member.

Donations to Museum: J. G. Lemmon of Sierra Valley presented twenty-five specimens of plants. T. J. Butler, of Arizona, presented a number of minerals. From Henry Edwards specimen of *Chiropsis nebulosus*. From Mr. Harford, *Clypidella Callomarginata* and parasite worm on *Glyphis aspera*. Ascidian from Santa Rosa Island, *Vermes* from Santa Rosa Island, common under stones. From Mr. Baldwin, *Lysiosquilla*. From Gen. Cobb, *Pelecanus erythrorhynchus*.

On the first of March, 1875, at the regular meeting of the Academy, a box of minerals from Australia was presented by Mr. E. O. McDevitt, through Gen. John Hewston, Jr. Having no place to put them, the box was not opened until recently, and was found to contain forty-eight specimens of minerals, seven teen fossils, six photographs, and a map of the tin fields of Queensland—all of which were exhibited. Eleven of these specimens are gold-bearing, three of lead ores, eight of copper ores, two of cinnabar in quartz associated with blue and green carbonates of copper disseminated through the quartz—these two are handsome specimens; there are none like them in the museum; two of antimony ores, specimens of Herschelite (a variety of Gmelinite), bismutite (a carbonate of bismuth), drift in which diamonds are found; a very interesting series of specimens from the tin fields, comprising tin crystals in quartz, wash dirt in which tin is found, stream tin, pebbles from tin washings, a smoky quartz crystal from the tin washings tourmaline (or schoolsand, being worn grains called by the miners sham tin), titaniferous iron sand (also called sham tin), bed rock of lode tin with tin crystals, and metallic

tin from the Queensland Tin Smelting works. There are also coal, chromic iron, granite, marble and other specimens. There are seventeen fossils, nine of which are fossil shells, two of fossil wood, one of the teredo in fossil wood, and shales from the coal mines containing impressions of leaves and ferns. Two photographs are of mummies, and four of birds, with their nests.

From J. G. Lemmon, *Botrychium ternatum*, *Marselia vestita*, *Glossopetalon Nevadensis*, *Darlingtonia Californica*, *Ivesia Pickeringii*, *Ivesia Gordoni*, *Ivesia unguiculata*, *Cyclademia humilis*, *Ranunculus Lemmoni*, *Astragalus Lemmoni*, *A. pulsifera*, *Webberi*, *Polemonium humile* (var.), *Eriogonum ursinum*, *Astragalus Casei* (new species), *Eriogonum*, *Blitum carinatum*, *Gentiana Newberyi*, *Horkelia* (sp.), *Ivesia Webberi*, *Ranunculus oxynotus*, *Viola Lemmoni*, *Corydalis Caseana*, *Draba aurea*, *Sanicula Nevadensis*, *Antennaria microcephalum*, *Hulsea cecaule*, *Scutellaria nana*, *Emmenanthus pusillus*, *Phoradendron libocedri*, *Glyptopleura marginata*, *Leucothæe Davisæ*, *Phacelia procera*, *Parnassia parviflora*, *Acerates atropurpurea*, *Cynoglossum occidentale*, *Cuphrosbia* (new species), *Platyspermum scapigerum*, *Potentilla Pattensis*.

Dr. Kellogg made some remarks on a plant presented.

Mr. Scupham asked for information on a plant which had the property of coagulating milk, like rennet.

Dr. Behr stated that the plant from which quassia comes has this property.

Dr. Gibbons said that *Gratiola Virginica* also had the property. Medical writers state that quassia is one of the best bitters known. He also spoke of the peculiarities of certain plants which were harmless to man and injurious to animals, and *vice versa*. He spoke of plants injurious to fleas, stating that the impression that the Yerba Buena leaves would drive away fleas was incorrect. The powder of *Artemesia filifolia* is fatal to fleas.

A discussion ensued concerning the poison oak, and the liability of some persons being poisoned while others escaped its evil effects.

REGULAR MEETING, MARCH 6TH, 1876.

President in the Chair.

Thirty-eight members present.

The following new members were elected:

Louis Janin, James D. Hague, H. S. Craven, C. A. Stetefeldt, C. W. Lightner, E. B. Dorsey, W. A. Skidmore, Howard Schuyler, Hamilton Smith, Jr., Alfred Poett, W. H. Hall, J. S. Curtis, Chas. Barton Hill

Dr. Stout, Curator of Ethnology, called the attention of the Academy to the peculiar sarcophagus in which the remains of the late Benjamin P. Avery had been brought from China. As there was a likelihood that this sarcophagus might come into the possession of the Academy, Dr. Stout wished a resolution passed authorizing the Curator of Ethnology to receive it.

On motion, Dr. Stout was appointed a Committee of one to receive the sarcophagus for the collection.

The President exhibited specimens of boomerangs, such as were used by the California Indians. They were in general similar to those used in Australia, though some minor points of difference are noticeable.

The President stated that he proposed to present verbally to the Academy some of the results of the experience gained during his recent trip of eighteen months duration. His travels had extended to Japan, India, Egypt, and parts of Europe, the principal object being the gathering of information with regard to the different late improvements in civil engineering in general, but more especially in the departments of River and Harbor improvements, and irrigation. He then made a short general statement regarding his trip.

A letter was read from Sir Edward Thornton with reference to the Albert Medal which is awarded annually by the society for the encouragement of arts, for distinguished merit in promoting arts, sciences and manufactures. Suggestions are invited from the Academy.

The resignation of W. J. Fisher as Librarian was tendered, and referred to the Council.

On motion of Dr. Stout, a vote of welcome was passed "to our returned President."

General Colton, of the Board of Trustees, stated that a letter had been received by the Board from the Central Pacific Railroad Company asking the use of certain ethnological specimens for exhibition with their collection at the Centennial. Mr. Scupham, a member of the Academy, would have personal charge of the Railroad Company's collection, and would take equal care of the objects loaned by the Society. He moved that the articles be loaned for the purpose specified.

Mr. Scupham explained that it was intended to make as full a display as possible of Pacific Coast material, and the co-operation of the Academy would be of assistance—the Company's collection of ethnological specimens being meagre.

The motion to lend the articles asked for was then put and passed.

REGULAR MEETING, MARCH 20TH, 1876.

The President and Vice-Presidents being absent, Dr. Harkness was called to the Chair.

Forty members present.

Chas. F. Dio Hastings was elected a member.

J. K. Nelson was proposed as a candidate.

Donations to the Museum: From F. A. Walley, chloritic slate, Sonoma Co. From Governor Purdy, silver ore from De Leon mine, Sonora, Mexico, and gold quartz from Calaveras County. From Dr. J. M. Hill, quartz from Calaveras County, Cal. From Geo. H. Saunders, specimens of mineral resin, hematite (red ochre), larva and petrified wood. C. C. Bean presented silver ore from Peek Mine, Arizona. T. J. Butler donated specimens of calcareous tufa, argentiferous galena from Arizona.

The Secretary read a communication from the President, giving data concerning the solar eclipse of March 25th, 1876.

W. N. Lockington presented a second paper "On the Crustacea of California," containing a description of seventeen new species.

Description of Seventeen New Species of Crustacea.

BY W. N. LOCKINGTON.

Platyes, nov. gen.

Rostrum simple, post and pre-orbital spines wanting, hinder feet laminate.

Platyes edentata, nov. sp.

Rostrum laminate, triangular, simple; carapace tuberculate, the tubercles not prominent, and each covered with smaller tubercles.

Form of carapace broad, pyriform; antero-lateral margin not well defined, indistinctly lobed; postero-lateral and posterior margins forming a continuous curve, without spines or projections. Eyes not projecting, rostrum and antero-lateral margin forming a continuous line.

Propodus of first pair smooth, oblong; fixed finger and dactylos closing only at the tips, which are somewhat spoon-shaped, manus with an alveolate upper edge. Hinder four pairs broadly laminate.

Length of largest specimen, a female, 0.44, greatest width, 0.38.

Three specimens of this small and curious species from Mazatlan, presented by Hy. Edwards. Not having seen anything similar, or met with any generic description which seems to apply in every respect, I propose to make it the type of a new genus.

Atergatis cristatissimo.

Carapace transverse, elliptic, the front and antero-lateral border forming the greater portion of an ellipse, the front not projecting beyond the line of the ellipse. Antero-lateral margin cristate, the crest divided by short sulci into four lobes, of which the 2d is short, the 1st and 3d long, and the 4th turns somewhat abruptly inwards, the crest ending half way along the postero-lateral border, which is short and only slightly concave. Front slightly waved. Areolation distinct upon the central and antero-lateral regions, but becoming obsolete posteriorly.

Chelipeds about equal in size, manus with three distinct low beaded ridges on the outer side, and a sharp crista above, the latter continued along the carpus. Fixed finger short, with a long sharp tooth on its inner face. Dactylos cristate above, inserted some distance below the upper margin of the manus. The fingers are pointed at the ends, and knife-like on their inner edges. Hinder limbs cristate, compressed, claws long and sharp. Color

(dried specimens) a bright vermillion red throughout, except the fingers, which are brown.

Length, 0.50; width, 0.70.

The specimens are from La Paz, Lower California, and were collected and presented by Dr. D. E. Hungerford.

Xantho multidentatus.

Areolets of anterior part of carapax distinct. 1 M confluent with 2 M, which is partially cleft by a furrow; all the antero-lateral areolets (1, 2, 3, 4, 5, 6 L) distinct; also, the postero-lateral (1, 2 and 3 R) and posterior (1, 2 P) sufficiently distinct to be made out.

The projecting lateral teeth are the normal ones, D being simple, E and T double, N and S triple. The upper margin of the eye is enclosed in a semi-circle of teeth, the outer of which is the first of the antero-lateral series. Two teeth intervene between the outer tooth and the front, which is four-toothed, and deeply emarginate in the centre.

Upper parts of hand and carpus covered with sub-seriate tuberculations. Posterior feet short, compressed, cristate.

The single dried specimen, a male, shows traces of a dark purple tint on the carapax and anterior feet.

It was collected at Mazatlan, by Mr. Hy. Edwards.

Acteodes Mexicanus.

Carapax smooth, unarmed, transverse, wide, antero-lateral border forming, with the front, the greater part of an ellipse. Teeth of antero-lateral border reduced to slight curves. Front somewhat waved, and slightly projecting beyond the general curve of the ellipse.

Areolets indistinct throughout, yet the median can be distinguished from the antero-lateral. The sulcus between the gastric and cardiac is well-defined, and most of the sub-regions can be made out. Postero-lateral border only slightly concave, forming a very obtuse angle with the posterior border.

Right cheliped the larger, entirely unarmed, smooth; fixed finger with two large tubercles on the inner face, dactylos with two large and two small tubercles; the fingers not spoon-shaped, gaping, and touching at the points only. Left cheliped smaller, and differing from the right in the fingers, which fit pretty closely throughout their length, tips spoon-shaped.

Hinder limbs smooth, weak, slightly heavy in the last two joints.

A single male specimen from Mazatlan, collected and presented by Mr. Hy. Edwards.

Length, 0.56. Width, 0.80.

The general color of the dried specimen is a dull reddish brown, inclining to red on the under side of the chelipeds. Fingers dark brown.

As the fingers of the smaller hand are distinctly spoon-shaped, I have called this an *Acteodes*, but it is evidently a connecting link between that genus and *Acte*.

Amphitrite Edwardsii.

Inter-antennal front four-toothed, the teeth rounded, and the central emargination by far the deepest. A deep sinus between the front and the pre-orbital tooth, which is two-lobed; thus there are altogether eight teeth between the eyes. Antero-lateral margin nine-toothed, the teeth alternately large and small, commencing with a post-orbital. Meros of left cheliped (the right is wanting in our specimen) with four teeth on the inner margin, the tooth next carpus much smaller than the others. Carpus with a long spine on the inside, and four spines on the outside. Manus with three spines above, and three rows of small tubercles on the outside. Fingers sulcate, tuberculate on inner border. Two transverse ridges across the carapax, one in the center of the length, divided into three portions by the sulci separating the central region from the antero-lateral ones; the other shorter, crossing the central region in its widest portion. These ridges are beaded.

Length, 0.87. Width, 1.25.

The specimen is a male, and was brought from Mazatlan by Mr. Hy. Edwards. This, and *Lupa bellicosa* Sloat, are the only Portunidae yet known on the Pacific Coast north of Central America.

Betæus equimanus. n. s.

Base of inner antennæ three-fourths the length of base of outer antennæ, flagella about half as long as those of the external antennæ. Outer appendage of inner antennæ about two-thirds as long as the inner. External antennæ considerably more than half as long as in the body. Outer maxillipeds as long as base of inner antennæ. Hands of first pair of legs about equal in size, oblong ovate; dactylos with a sharp recurved point, and a straight cutting edge margined with setæ; the cutting edge is opposed to a similar straight cutting edge, also margined with setæ, on the palmar surface, which also ends in a sharp incurved point. The fingers gape somewhat at the proximal end, where they are tuberculate. Second pair of feet slenderer than the third and fourth; but not much longer.

Front curvately emarginate between the eyes, which are clearly visible through the projecting part of the carapace. Carapace recurved. Body considerably depressed. Epimera (Coxæ) of second abdominal segment large, overlapping those of the adjoining segments.

Length of larger specimen, 1.05.

Two specimens, both females with ova, which in one case are large and evidently mature.

This species lives under the mantle of *Haliotis rufescens*, and the specimens were procured at Catalina Island by S. A. L. Brannan. Color in alcohol, a light flesh color, the liquor itself taking the same tint; when fresh, a dark purple.

Alpheus clamator.

Front tri-spinose, the largest point forming the rostrum, and slenderer than the others, from which it is separated by a deep sulcus; the lateral spines quickly widening out into a shield curved closely over the eye. Carapace

smooth, body not greatly compressed. Epimera of second segment overlapping those of preceding and succeeding segments.

Flagella of inner antennæ about half as long as body, those of outer antennæ more than three-quarters as long as body.

Hands of first pair of legs dissimilar both in size and form. Fingers of smaller pair straight, parallel and slender, closely fitting; the manus with a spine above, and a constriction posterior to the insertion of the dactylos. Manus of larger or right hand large, with a large spine on the outer side, continued as a carina for a considerable distance backwards, and with a deep sulcus above the carina. Dactylos short, curved obliquely downwards, thick and swollen at the extremity. A deep transverse sulcus between the dactylos and manus, ending in an oblique longitudinal sulcus having its origin on the upper edge of the manus; from the latter sulcus a second transverse one is continued down the inner side of the manus.

Both hands setose, the hairs long and numerous.

Carpus of second pair five-jointed, third and fourth joints shortest, the manus and dactylos slender.

Length, 1.05.

Color, in alcohol, a light flesh tint, much deeper on the large hand. A darker spot on the upper surface of the carapax, also on the anterior edge of the two first abdominal segments.

This species lives in pools on rocky reefs at low-tide level, and is capable of producing, by clapping together the fingers of the larger hand, a snapping noise like that which can be made with the finger-nail.

Collected at Santa Barbara Island by S. A. L. Brannan.

Idotea pulchra.

Body stiffly articulated. Cephalic shield emarginate in centre of front forming two lobes.

First thoracic segment concave in front, advancing around the head; first four thoracic segments sub-equal in length; 3d and 4th about equal in width; three hinder thoracic segments much shorter. Abdomen one-jointed, one short partial suture on each margin near thorax, tapering to posterior extremity, which is narrow, but concave. Margins of all the thoracic segments deflected outwards horizontally.

Flagellum of outer antennæ not quite as long as base, 16-jointed, base somewhat setose. Inner antennæ very short.

Length 1.15 in, breadth 0.52 in.

When recent, the coloration of this species is very beautiful, consisting of red cloudings on a lighter ground.

The two specimens, male and female, in this collection were brought from the W. coast of Alaska, N. of Bering's Strait, by W. J. Fisher, Naturalist of the U. S. S. *Tuscarora*, Deep-Sea Sounding Expedition.

Idolæga. nov. gen.

Last pair of abdominal appendages operculiform, and concealing all the preceding pairs, as in *Idotea*, but with four posterior pairs of legs, with

small claws, and the three anterior pairs sub-dactyle, as in *Pterelas* in the family *Egidae*.

Idotaga longicauda.

Thorax increasing in width to the central segment, length of segments nearly equal, the posterior slightly shorter. Cephalic shield deeply emarginated at sides, each border forming two blunt teeth. Epimera large, pointed, extending behind their respective segments, the backward curvature increasing with each successive segment. Abdomen at origin as wide as thorax, first three segments pointed on each side, the point directed backwards; fourth segment narrower and shorter than the others, and enclosed laterally by the third; terminal segment very long, more than one-third the total length of animal, and gradually diminishing to a truncate point.

Eyes remote, inconspicuous. Flagellum of external antennæ nine-jointed. First joint very long, flagellum about equal in length to base, which is hirsute on interior margin. Internal antennæ reaching to near middle of ultimate basal joint of outer antennæ. First three pairs of legs sub-didactyle, with a short hatchet-shaped process on the joint preceding the manus, which is broad and margined with short hairs on palmar border. Four posterior pairs of legs with short stiff hairs on the upper margin of 3d, 4th, and 5th joints.

Two specimens showing a slight difference in the form of the caudal segment, which in the smaller specimen has an obtuse angle on each lateral margin, at about one-third of its length from the extremity.

Length of large specimen, 2.80 in.; greatest breadth across epimera, 1.00 in.

Length of smaller specimen, 1.80 in.; greatest breadth, 0.66.

The larger one was found by Capt. T. W. Williams, in lat. 67.30 N., long. 163.02 W., near the coast of Alaska. The smaller specimen was found by J. W. Fisher.

The larger is a skeleton only, the smaller, a male, in alcohol.

This species is totally distinct from any yet found on the Pacific Coast, but, since it occurs so far to the north, it is possible that it may be identical with some previously described species from the Arctic waters of the northeast of America.

Spheroma olivacea.

Cephalic shield curved anteriorly, distinct from the first thoracic segment, which is but slightly longer than either of the succeeding four segments; last two thoracic segments very short. Abdomen with two distinct joints, the first marked with two partial sutures; the hinder segment curved posteriorly; caudal process not reaching beyond the caudal segment.

Length, $\frac{1}{2}$ of an inch.

This species is exceedingly common in the lagoons of the salt-marshes at Fort Point, San Francisco, where it resides among weeds, or adhering to the underside of sticks, etc.

The chief distinctions between this species and *S. Oregonensis* as figured by Dana, are the more projecting cephalic segment, and the small size of the two hinder thoracic segments.

Aega Harfordii.

Sides of thorax almost straight. segments sub-equal. Cephalic shield rounded in front, eyes conspicuous, situated at the postero-lateral angle of shield. Abdominal segments five or four, last segment pointed. Exterior antennae more than half the length of body, flagellum more than twice the length of base, many-jointed.

Epimera of all the thoracic segments except the three first, pointed behind, and extending further back than the segment to which they are attached. Claws of first three pairs of legs comparatively feeble.

Length, 0.63 in.

Collected at Santa Rosa Island by W. G. W. Harford, under stones at mid-tide in muddy places. Numerous.

Aega alaskensis.

Body broadest at 5th thoracic segment, sides regularly curved, 5th and 6th thoracic segments greatly larger than first four thoracic segments, 7th segment longer than 4th.

Head pointed in fronted, the sides continuing the curve of the thoracic segments. Epimera of 4th segment pointed posteriorly, as are also those of 5th, 6th and 7th thoracic segments.

First four segments of abdomen concave posteriorly, and ending laterally in a point directed backwards; 5th segment with a straight posterior margin, pointed at sides; terminal segment a half oval.

Eyes large, conspicuous, not projecting. Antennae short, the outer reaching to the suture between 1st and 2d thoracic segments; flagellum about equal in length to base. Last four pairs of legs somewhat spinose.

Color (in alcohol) 4th, 5th, 6th and 7th thoracic segments dark brown, a little dark brown on posterior part of 4th and 5th abdominal segments, rest of body yellowish; egg-case dark brown.

Three specimens, all females, taken from codfish caught in Ounimak Pass, Alaska, lat. 54° 40', long. 165°, by Capt. T. W. Williams.

Length of largest specimen, 1.30 inch; greatest breadth, 0.48 inch.

Lygia septentrionalis.

Two posterior thoracic segments much shorter than the anterior ones, and greatly curved. Caudal stylets short, about half as long as abdomen.

Outer antennae about half as long as body, flagellum with twelve somewhat oblong joints, somewhat shorter than base. Cephalic shield with a waved, somewhat two-lobed posterior margin.

Length, without caudal stylets, 0.80 in. Width, 0.45.

The sides, from the second to the sixth thoracic segment, are almost parallel. Two specimens from Tanaga, one of the Aleutian Islands, presented by Mr. W. J. Fisher, naturalist of the U. S. Exploring Ship *Tuscarora*.

The general facies of this species is very like *L. occidentalis*, but it is easily distinguished by its short posterior stylets.

Caprella tuberculata.

Inner antennæ long with a fringe of long setæ on their underside; second, third and fourth joints about equal in length. Outer antennæ without setæ, almost as long again as inner ones: flagellum somewhat larger than the two last basal joints; second basal joint larger than the preceding or succeeding ones; the entire base not quite as long as inner antennæ.

Propodus of 1st and 2d pairs oblong ovate, without teeth or spines, dactylos long and slender, fitting close to palmar surface. Manus of second pair spinose at extremity. Branchiæ short and thick.

2d, 3d, 4th and 5th segments long, sub-equal, the 1st segment somewhat shorter, the 6th and 7th very short. The whole of the dorsal surface sparsely covered with small sub-spinose tubercles.

Length of a large female, 0.90; ditto, from extremity of larger antennæ to top of posterior dactyli, 1.75; of outer antennæ, 0.56; of inner, 0.30 in.

Several specimens, chiefly females, were brought from Icy Cape by Mr. W. J. Fisher, who procured them by dredging, at a depth of from seven to fifteen fathoms.

Megalorchestia franciscana.

Body smooth; superior antennæ one-third longer than the body, the flagellum longer than the base, with about thirty-five oblong joints. Superior antennæ reaching to middle of 2d joint of inferior. Second epimerals longer than deep, fifth short, bi-lobed. Anterior feet unguiculate, joints scabrous. Hand of second pair very large, oblong ovate, with an almost transverse palm, having a low oblong tooth near centre of palm. Dactylus much curved, touching palm at point only when closed.

Length of body, 0.87; of inferior antennæ, 1.15 inch.

A single specimen of this species was found by myself among the debris at high-tide level, Alameda Co., Cal.

The antennæ in the recent specimen were red.

This amphipod resembles *O. scabripes*, Dana, but differs from the figure of that species in Dana's work in the greater number of joints of the inferior antennæ, the shape of the tooth of the hand, and the proportion of the second epimerals. From *M. Californiana*, Brandt, it differs in the short fifth epimeral, and the scabrosity of the feet.

Edicerus Behringiensis.

Cephalic shield rostrate, the rostrum about one-third the length of superior antennæ, curved downward, pointed. Eyes moderately large, contiguous. First six thoracic segments much shorter, with a slightly raised keel in the centre of each. Seventh and abdominal segments long, the seventh thoracic and two first abdominal with the carina divided into two sub-equal teeth, the third abdominal with a long low carina ending in a spine posteriorly.

Fourth epimeral much longer than the fifth. Superior antennæ about three-fourths the length of the inferior; flagellum twice the length of last basal joint. Inferior antennæ about one-third as long as the body, proportions like those of superior. Hands of first two pairs of feet oblong ovate, palms nearly

straight, dactyli long, fitting close. Seventh pair of feet larger than the others, but not extending much beyond the end of the caudal stylets, which are nude.

Length from end of rostrum to end of caudal stylets, 1.25 in.

Four specimens from West coast of Alaska, North of Behring's Straits.

Presented by the Alaska Commercial Company.

Lysianassa Fisheri.

Segments of thorax about equal in length, smooth; third segment of pleon one-fourth longer than the second, with a well-defined sinus on the posterior margin, bounded by a sharp tooth below.

First epimera larger than two succeeding pairs, and extending forwards at their lower portion; fourth epimera largest. First joints of superior antennæ very stout, touching each other, so as to appear a prolongation of the cephalon; second joint very short and stout.

Length, including stylets, 1.38 in.

A single specimen of the above species was obtained on the West coast of Alaska, and presented to this museum by W. J. Fisher.

As the specimen is unique, and dried in such a way that the four first pairs of feet are folded together within the epimera, it is impossible to describe them.

Mr. Gruber read the first of a series of popular papers on Ornithology, illustrating his remarks with appropriate specimens prepared by himself.

REGULAR MEETING, APRIL 3D, 1876.

President in the Chair.

The following propositions for membership were received:

Albert Arents, C. A. Lockhardt, Louis Falkenau, H. W. Reese, Emlen Painter.

Donations to the Museum: From C. B. Turrill, specimens of *Batrachoseps attenuatus*, *Gerrhonotus*, *Actinemys marmoratus*, *Plestiodon*, sp., *Bufo Columbiensis*, trout from Donner Lake, *Bryttus*, *Myriapods*, *Arachnidæ*. From Henry Edwards, specimens of *Diemyctylus torosa*, twenty-seven specimens of *Myriapoda*, and sp. of *Pseudobdella*. From W. N. Lockington, specimens of *Asterias*.

From A. W. Saxe, borings from artesian well at Santa Clara. From Capt. Thos. W. Williams of whale ship Florence, eyes of the *Balaena Mysticetus* and *B. Sibbaldius*. From F. Gruber, specimens of barred owl (*Syrnium nebulosum*) mottled owl (*Scops Asio*), and Carracara eagle (*Polyborus thaurus*). From Henry Edwards, *Dyadophis mirabilis*. From Col. Geo. E. Gray the following mollusca, *Anodonta Californiensis*, *Physa humerosa*, *Tyronia Clathrata* (Stmp.), and *T. protea*. From Henry Hemphill, specimens of new species of brackish water mollusk, *Paludinella Newcombiana*, with descriptions. Also *Alexia setifer* from Kureka, H. B., a shell found also on China, but possibly introduced on this Coast by the Chinese.

Description of a New California Mollusk.

BY HENRY HEMPHILL.

Paludinella Newcombiana. Hemphill.

Shell thin, turbinate with four or five rounded whorls; apex sub-acute, last whorl somewhat inflated, subrimate, with or without three or four longitudinal brown bands; aperture ovate, outer lip thin, inner lip appressed to the columella and somewhat thickened; suture deep; epidermis greenish.

Operculum with nucleus sub-central with $2\frac{1}{2}$ whorls.

Length of largest specimen, $\frac{3}{8}$ inch.

Breadth of largest specimen, $\frac{1}{8}$ inch.

Habitat, Humboldt Bay, California.

I found this shell quite abundant on the Salt Marshes surrounding Humboldt Bay, California, associated with *Alexia setifer* Coop., and *Assiminea Californica* Coop., both of which are also abundant.

I take great pleasure in naming this species after my old friend Dr. W. Newcomb, well-known to the Scientific world, to whom I am much indebted for aid in my conchological pursuits.

W. N. Lockington read a paper on the anatomy and classification of Echini or sea urchins.

Dr. Kellogg described a new species of the order Compositæ, which he named *Brickellia multiflora*:

Brickellia multiflora.

BY DR. A. KELLOGG.

Stem 1—2 feet, woody, perennial, white, striated, erect; heads very small, (about five lines long,) 3—4-flowered, compound leafy racemes panniculately.

massed, oblong-pyramidal, terminal and axillary racemelets clustered; leaves alternate, short petiolate, ovate-oblong, corneous, acute, entire (or sub-entire,) triplinerved, impressed glandular alike above and below, varnished and viscid, strongly recurved. Involucre 3—4-flowered, scales in 4—5-series, outer shortest, ovate, acute, varnished, viscid, granular and glandular, intermediate lanceolate, oblong, acute, scarcely puberulent, deeply striate-nerved, interior linear, elongated, mostly obtuse scarious, longer than the pappus, shorter than the corolla; corolla ochroleucous, five-toothed border expanded, branches of the style exerted obtuse, clavate, glabrous; pappus white, single, very minutely villous, much shorter than the corolla; achenia 10-striate, striæ sparsely pubescent.

On dry rocky ledges of Sierra Nevada Mountains. Two or three feet high, spire shaped top; leaves varnished alike above and below, 1—2 or more inches long, $\frac{1}{2}$ —2 wide. Myriads of flowerets with thread-like branches of styles protruding, give it a yellowish hue, and the inner elongated scales glistening with white, so spangle the eye as to give it a peculiar arid appearance, notwithstanding the varnished green leaves intermixed.

President Davidson gave a very interesting account of the irrigation works now in course of construction in British India. The paper was accompanied by maps and diagrams.

Dr. Hale of New York mentioned a curious case of mimicry observed by him in the Santa Cruz Mountains, viz: a small spider exactly resembling the flower of the *Madroña* in color, size and form.

REGULAR MEETING, APRIL 17TH, 1876.

President in the Chair.

The following new members were elected: S. Lubeck (life), Joel F. Lightner, T. Bechtinger, J. K. Wilson, J. F. Meyers.

Robert Chalmers Lord was proposed as a candidate for membership.

Donations to Cabinet: Spider mimicking madroña flower, from Wm. Barber. Specimens of ore from Samuel Geddes, A. B. Stout, Barry & Patten, C. F. Kirchner, and Governor Purdy.

Captain C. Bryant, U. S. Treasury Agent to the Pribiloff Group of Islands, Behring's Sea, on the invitation of the President, gave an interesting description of the seal fisheries, and of the fur seal.

REGULAR MEETING, MAY 1ST, 1876.

President in the Chair.

Thirty-two members present.

Edward P. Morse, Walter Damenburg and Rudolph Thor-
mann were proposed for membership.

Donations to the Museum: Rock Salt from T. J. Butler; mar-
molite containing gold, from Gov. S. Purdy; silver ore, (South
Barcelona mine) from Louis Blanding; silver ore, (Leopard
mine) from Mr. Marshall, through Henry Edwards; ten speci-
mens Amianthus; specimens of common salt; forty-five specimens
of copper ore from Inyo and Placer Counties, argentiferous gal-
ena, flint nodule, from C. D. Gibbes; specimens roofing slate
and purple slate, from Gen. John Hewston, Jr.; rock salt, from
H. Robinson; six specimens rich gold quartz and amianthus, from
Dr. J. M. Hill; *Mus decumanus*, from Wm. Barber; beetles from
India, from Prof. Davidson; *Tubicola longipes*, from W. N. Lock-
ington; *Lockingtonia fluvialis*, and *Alloniscus masculosus*, from
W. G. W. Harford; four specimens of birds, from W. G. Blunt.

The President spoke of the tarantula, and presented and
quoted P. Martin Duncan to correct a misapprehension concern-
ing the insect.

Dr. Blake presented a specimen of infusorial earth obtained
from the hills about a quarter of a mile south of the N. E.
end of Lake Merced. The deposit was known as the "chalk
mine," and a considerable quantity of it had been sent to the
Eastern States, as he understood, for the purpose of polishing
glass. The deposit has been opened on the side of the ravine.
So far as exposed, it appears to form a continuous stratum which
has been cut into so as to expose a section of about four feet in
thickness, although it probably is much thicker, as the whole
hill for some distance seems to be formed of it. It was traced,
cropping out at intervals, a distance of 300 yards to the west
of where it had been opened, beyond this to the west the sur-
face of the hill was covered by shifted sand. The bed has a dip
of about 20°, a little to the E. of S., and appears to be undis-
turbed. The highest part of the outcroppings is at an elevation

of about 200 feet above the sea, and the bed probably belongs to the Pliocene formations that are found cropping out along the beach to the south of Lake Merced. The deposit has been formed in this laminae, and between some of these, ripple marks left by the retreating tide, are perfectly preserved, as in the specimen presented this evening. A microscopical examination of the rock shows that it is made up of silicious particles, evidently of organic origin, probably the remains of diatoms, but no perfect diatom has been discovered. The earth would seem to be composed almost entirely of the remains of the silicious external covering of the diatoms. The more tenacious lamina that have preserved the ripple marks, contain a considerable quantity of clay.

W. N. Lockington read the following paper describing a new species of Colubrine Snake:

Description of a New Genus and Species of Colubrine Snake.

BY W. N. LOCKINGTON.

Bellophis nov. genus.

Body deeper than wide except near the head. Head and fore part of body depressed. Head much wider than the neck with an obtuse snout. Scales smooth, rhombic. Cephalic plates normal. Nasal plates, 2; the nostril near the posterior edge of the anterior plate. A small rectangular breal. A large ante-orbital and two post-orbitals; the lower smaller, partly in a notch between the fourth and fifth labials. Upper labials, 6—7, the centre of the eye over the commissure noiomma, between the third and fourth.

Dorsal rows of scales, 23. Abdominal scutellæ more than 190. Last abdominal scutellæ entire. Sub-caudal 45, divided. Tail short, about one-seventh the length of the body.

General color—Rings of red, white and black, the abdomen lighter but with traces of the same colors.

Bellophis zonatus. nov. sp.

Rostral plate broad; vertical, almost straight along its anterior edge; temporal shields large. Two pairs of ventral scutellæ, those of the opposite sides closely applied to each other. Nostrils large, infundibuliform. Scales rhombic, increasing in size from back to sides. Snout, top of head and chin black, then a ring of white over the head, continuous with the white of the throat. About 62 black rings from head to end of tail, the first ring just behind the occipital plates. The spaces between the black rings filled alter-

nately with rings of red and white, of which there are 29 of the former color, and 32 of the latter, without counting that on the head.

The difference in number between the red and white rings arises from the fact that the red rings die out upon the hinder part of the tail, which has white rings only.

The red rings in many cases do not cross the back, but are divided by the junction of a pair of black rings. The black rings become wider on the centre of the back, approaching, and in most cases, joining each other in pairs, but always at the expense of the red rings, the white rings being invariably continuous with the white of the abdomen. There are traces of red on parts of the abdomen, and the black rings can generally be partially traced across the abdominal scutellæ.

The specimen in this collection has six upper labials on one side, and seven on the other, the sixth and largest on the left side, being represented by two shorter plates on the right side.

Length of body, 13 inches; of tail, 2 inches.

Abdominal scutellæ, 198; sub-caudal, 45; dorsal rows of scales, 23.

Locality, Northern California. Presented and collected by Paymaster Stanton, U. S. N.

In Baird & Girard's catalogue, p. 153, Blainville's description of *Coluber zonatus*, of which those authors had seen no specimens, is given, and appears to agree in most particulars with the species here described, but the nostrils are hollowed out of the anterior nasal, and the color is different. Blainville describes his specimen as "Reddish white, entirely annulated with deep black, with two half rings of the same color on the head." It is very probably the same species, and for this reason I have preserved his specific name of *zonatus*, but the entire last abdominal scutella, want of carination of dorsal scales, and smaller number of abdominal scutellæ, appear to me to necessitate the formation of a new genus.

W. G. W. Harford read a paper describing a new genus and three new species of Sessile Eyed Crustacea.

Description of a New Genus and three New Species of Sessile Eyed Crustacea.

BY W. G. W. HARFORD.

Lockingtonia. n. g.

Antennæ *not* appendiculate. First three segments of the pleon dorsally carinated, and posteriorly produced to an acute point. Three posterior segments of the pleon *not* furnished with fasciculi of spines on dorsal surface. Eyes, round. Telson, single. Habitat, fresh water.

The above genus agrees with *Dexamine* and *Atylus* in its non-appendiculate antennæ. It differs, however, from the former in having the first pair of gnathopoda chelate, three instead of four anterior segments of the pleon dorso-posteriorly produced to a sharp point, and from the latter in the man-

dibles wanting the palpiform appendage. It is removed from *Gammarus* proper by having no fasciculi of spines on dorsal surface, no appendage to the antennæ, and a single telson. This is a very common Amphipod in nearly all our lakes and small streams, and it is somewhat remarkable that it has until now escaped detection. It occurs in great numbers in Lobos Creek, where our specimens were obtained; also in the streams of Alameda County, and I doubt not, may be found in any of the permanent fresh water ponds or streams along our Coast for a considerable distance north and south of here.

It is with pleasure that I dedicate this genus to Mr. W. N. Lockington, whose ability and industry has accomplished so much towards an orderly arrangement of the Crustacea in our Museum, thus giving us an invaluable cabinet of reference for those who desire to pursue investigations in this interesting department of zoölogy.

Lockingtonia fluvialis. n. s.

Superior and inferior antennæ setose. Superior a little more than half the length of the inferior antennæ, and much longer than their base. Terminal joint of inferior antennæ longer than the preceding; flagella twelve jointed. Flagella of superior antennæ ten jointed. Caudal stylets and legs setose; the latter especially so at the joints. Hand oblong-ovate, palm setose, oblique. Carpus produced posteriorly along the proximal side of the manus.

Hand of first pair of gnathopoda chelate.

Length, $\frac{5}{8}$ inch.

Alloniscus maculosus. n. s.

Cephalon slightly transverse, rounded in front. Outer joint of inner antennæ sub-clavate, with four spines on its summit. Outer antennæ spinulose at the joints. Flagellum multiarticulate, setose at joints. Last joint of outer antennæ about one-third longer than the preceding. First segment of the pereion longer than the 2d, 3d, 4th or 5th. The 6th and 7th shortest. The lateral margins of the first two segments of the pleon concealed under the seventh of the pereion. Color light brown above, with yellowish brown spots, becoming darker in alcohol.

Length, $\frac{7}{8}$ inch.

This is doubtless identical with some specimens of this genus which Prof. Dana had before him while describing his *Alloniscus perconvexus*, and which he says may probably be another species, Proc. Phil. Acad. 1854, p. 176. It is very near *A. perconvexus*, but may be readily distinguished from it by its light brown color above, with yellowish spots, and its still lighter colored limbs, which are minutely spotted with reddish brown, and its more slender form.

We found our specimens on Angel Island among fern roots, *Woodwardia radicans*, early in March last. A few only obtained.

Asellus Tomalensis. n. s.

Head a little transverse, narrower than the body. Upper antenna not reaching to the extremity of the peduncle of the lower. Flagellum of lower

antennæ longer than its peduncle. Body narrow in front, gradually increasing in width towards the tail.

Peduncle of caudal appendages more than half the length of the terminal filaments.

Length, $\frac{6}{10}$ inch.

This interesting little Isopod was recently obtained by Mr. W. N. Lockington while collecting at Tomales Bay and vicinity, and is, so far as I am aware, the first example of the genus found on this Coast. In that excellent work, "British Sessile Eyed Crustacea" (Bates & Westwood), two species are accredited to N. A., but we find no mention of them by any American author we have applied to, and it is most probable that they were from the eastern part of the continent. We therefore venture to offer this as new. A single specimen only was found, although several casts of the net were made. It would seem, therefore, very uncommon in that locality. We hope, however, that by diligently searching the fresh water ponds and streams along our Coast it may be found in greater numbers, with, possibly, other species of the genus. I hope that collectors will carefully examine our fresh waters for this Crustacean, thereby enhancing the value of our cabinet, and aiding students in acquiring a knowledge of these very interesting little creatures.

W. N. Lockington read the following description of a new genus and species of Decapod Crustacean and the male of *Phyllodurus abdominalis*:

Description of a New Genus and Species of Decapod Crustacean.

BY W. N. LOCKINGTON.

Family PINNOTHERIDÆ.

Tubicola. nov. gen.

Carapace extremely broad; fourth pair of legs much elongated, fifth pair rudimentary.

Habitat, the inside of the tube of an annelid.

Tubicola longipes. nov. sp.

Carapace broad, transverse, more than twice as wide as long; front occupying about one-third of the width of the carapace; antero-lateral margins broadly rounded; postero-lateral somewhat concave, the two meeting at an acute angle in the middle of the side of the body; posterior margin straight.

Branchial regions largely developed, tumid; a long transverse depression in the carapace behind the gastric region; antero-lateral margin bordered by a fringe of setæ.

Third joint of external maxillipeds very small; second joint stout and large.

First pair of legs short, with short carpus and flattened elongated manus having a fringe of setæ on its upper border.

Second and third pairs of legs sub-equal, longer than the first, slender, ending in a sharp claw; the third pair slightly longer than the second.

Fourth pair immensely developed, exceeding in length the width of the carapace, terminating in a stout claw.

Fifth pair shortest, reaching to about the middle of the third joint of the fourth pair; usually held in an elevated position over the posterior portion of the carapace.

Width of carapace a little less than $\frac{1}{4}$ inch; length, $\frac{3}{8}$ inch.

Total length from claw to claw at fourth pair, $\frac{3}{4}$ inch.

Habitat, the sand-constructed tube of an annelid.

I found this curious little crustacean on the tube of an annelid common on the sandy flats left bare at low tide in Tomales Bay. While digging for those sand-excavating lobsters, the *Gebie* and *Callinassae*, I found in abundance the sandy tubes of an annelid about six inches long, with numerous joints or nodes, each of which was surrounded by a circle of setae, by whose action the creature propelled itself at pleasure up and down the tube.

Believing the worm to be a new species, I gathered some, and while pulling the tube to pieces, and admiring the rich brownish red tint conspicuous at each node of my new prize, I was surprised to see a long narrow creature move out, as I believed, head first; but a nearer inspection showed me that the motion was sideways, and that the new-comer was no fourteen-legged amphipod or isopod, but a true decapod crustacean.

The short chela, extremely lengthened fourth pair of legs, and short, broad body, are so many adaptations to the mode of life of this creature, which finds an ample dwelling-place in the space intervening between the body of the annelid and the inside of the tube; up and down which it moves with its long fourth pair stretched out in such a manner as to give it the elongated appearance of a *Caprella*.

The width of *Tubicola longipes* from end to end of the fourth pair of legs is eight times greater than its length from front to back.

This is, so far as I am aware, the only instance known of a decapod crustacean becoming the guest or commensal of an annelid, for although the species of the family *Pinnotheridae* are all commensals, most of them reside between the folds of the mantle of large bivalve mollusks, such as mussels or clams (thus the *Fabia subquadrata* lives within the mantle of *Pachydesma crassatelloides*, a large clam of this Coast), and a few live within the tests of Echini, close to the anal aperture.

It is most probable that this worm and its commensal may occur in many other places besides Tomales Bay, possibly in San Francisco Bay, and I should be much obliged if some of our friends who may go out on a fishing excursion would bring me specimens, in alcohol, of the worm and its tubes, that I may find whether the crab is its constant companion in all localities.

The worm is one which is frequently used for bait.

On April 20th, the females of this interesting little crustacean was loaded with spawn.

Phyllodurus abdominalis. Stimpson.

When Stimpson, in his Crustacean and Echinodermata of the Pacific Shore of N. A., page 71, first described this species, the female only was known to him. This female, like all those belonging to the family *Bopyridæ*, is of comparatively large size, broad and clumsy in appearance, and lives attached to another crustacean.

The crustacean frequented by this commensal is *Gebia pugettensis*, a marine crayfish common on these shores.

About April 24th, I gathered a great number of Gebias in Tomales Bay, and found that most of them, all except the largest specimens, had a female *P. abdominalis* attached to one of the abdominal pairs of feet, to which it clung closely by means of its hooked claws.

A close inspection revealed, beside or near the large female, a small and slender male, a kind of miniature edition of its stout mate.

Never more than a single pair were ever found attached to one Gebia, but the males appeared so regularly to accompany the females, that I believe that in the few cases I did not find them, it was because they had dropped off in handling the specimens.

The males do not live attached to the Gebia, but are free to rove, and their constant presence at this season by the side of the females proves that this is their season of love.

Male. Head semi-circular anteriorly, closely united to the succeeding segment. Third and fourth thoracic segments widest. Body oblong, boat-shaped, tapering slowly from the fourth to the seventh thoracic segment.

Outer antennæ four-jointed; inner very small, reaching about to the middle of the second segment of the outer.

Eyes too small to be distinguished by a Coddington lens.

First abdominal segment a little narrower than last thoracic, but flat; succeeding segments tapering rapidly to the sixth or telson, which is pointed at the end, and is provided on each side with a small lamella, giving the whole telson somewhat the appearance of a spear-head.

The lateral laminae of the first five abdominal segments round in sections instead of segmental, as in the female, and considerably longer than the width of the segments to which they are attached.

The President referred to a letter on the subject of irrigation sent to him by P. J. Flynn, and explained some of the errors into which he had been led.

The President read a continuation of his paper on Irrigation in India, Egypt and Italy.

The President communicated to the Academy, by the authority of the Superintendent of the Coast Survey, the following memoranda:

DETERMINATION OF THE DIFFERENCE OF LONGITUDE, BY THE ELECTRIC TELEGRAPH, BETWEEN THE U. S. COAST SURVEY STATIONS AT SAN FRANCISCO, CALIFORNIA, AND SEATTLE, WASHINGTON TERRITORY.

DATE.	SEATTLE EAST OF SAN FRANCISCO.		MEAN.	\triangle	DOUBLE TIME OF RETARDATION.	TIME OF RETARDATION.
	Seattle Signals.	San Fran- cisco Signals.				
1871.	<i>S.</i>	<i>S.</i>	<i>S.</i>	<i>S.</i>	<i>S.</i>	<i>S.</i>
Sept. 12....	18.22	18.48	18.35	0.09	0.26	0.13
13....	.22	.51	.37	.07	.29	.15
14....	.25	.74	.49	.05	.49	.24
19....	.31	.62	.47	.03	.31	.15
21 .	.33	.76	.54	.10	.43	.21
23....	.30	.57	.44	.00	.27	.14
30....	.24	.61	.42	.02	.37	.18
Oct. 2....	.30	.62	.46	.02	.32	.16
8....	.25	.57	.41	.03	.32	.16
9....	.27	.59	.43	.01	.32	.16
12....	.24	.56	.40	.04	.32	.16
14....	.38	.70	.54	.10	.32	.16
15....	.28	.62	.45	.01	.34	.17
	18.276	18.612	18.44	....	0.34	0.17

		<i>S.</i>	<i>S.</i>
Correction for personal equation.....	—	0.02 ± 0.01	
		<i>S.</i>	<i>U.</i>
Resulting difference of Longitude	=	18.42 ± 0.02	
		<i>H.</i>	<i>M.</i>
Telegraphic Longitude of San Francisco station.....	8 09	38.35 ± 0.08	
Hence Longitude of Seattle.....	8 09	19.93 ± 0.08	
Or in Arc.....	122° 19'	58.59 ± 1.2'	

Observer at San Francisco, George Davidson.

Observer at Seattle, S. R. Throckmorton, Jr.

Communicated to the California Academy of Sciences by authority of the U. S. Coast Survey, April 17th, 1876.

REGULAR MEETING, MAY 15th, 1876.

President in the Chair.

Twenty-one members present.

The following new members were elected:

H. W. Reese, Albert Arents, C. A. Luckhardt, Emlen Painter, Louis Falkenau.

Donations to the Museum: From Lieut. Murray S. Day, U. S. Navy, the following articles from the "Ainos" of the Islands of Yesso, Japan: one bow and three arrows, one of which is prepared with poison; one piece of Aino cloth made of the inner bark of the Mikapp, a kind of ash; also sword used in making the cloth; one fisherman's knife; one pair Aino socks, made of bark; one pair of winter shoes, made of salmon skin; one "Passu," or moustache lifter, used in the drinking ceremony for lifting the moustache; one hat, made of bark twine; one musical instrument, called the "Ka," played with four strings and two bridges. From C. D. Gibbes, thirty specimens of silver, copper, native copper, cinnabar, pyrites and quartz crystals. From A. H. Nahor, specimens of silicified wood and gold-bearing cement from Iowa Hill, Placer Co., Cal. From G. A. Treadwell, thirty-three specimens of ore. From W. Collis, a specimen of oak with a piece of some kind of mineral in the centre. From Henry Edwards, specimens of marmoratus, ostracion, Pegasus and Grapsus. From W. G. Blunt, specimens of Segnathus, and eggs of some of the Rhinotalidæ. From Geo. Davidson, Coleoptera from Egypt.

Mr. C. D. Gibbes read some remarks on the minerals presented at the last meeting.

Professor George Davidson read a continuation of his paper on Irrigation in India, Egypt and Italy.

REGULAR MEETING, JUNE 5TH, 1876.

President in the Chair.

Thirty-seven members present.

The following new members were elected: Rudolph Thormann, L. L. Hawkins, Walter W. Dannenberg, Edward N. Moor, and Robert Chalmers Lord.

Donations to the Museum: From E. S. Holden, lignite from coal mine, Alameda County. Bog iron ore from Calaveras County; portion of tarantula nest. From Thomas Holmes, red hematite from Nevada. From C. D. Gibbes, anthracite coal from Pennsylvania. From A. B. Stout, trachite from Sonoma County. D. Buck presented silver ore from Lee District, Inyo County, Cal. From Henry T. Compton, fifty eggs. From W. N. Lockington, four specimens of fish, and eggs of the spotted shark. From T. J. Butler, Arizona parasitic plant. Bamboo plant from Professor Davidson. From James Lick, fossil tooth found in digging road to new observatory on Mt Hamilton.

Henry Edwards presented a paper on Pacific Coast Lepidoptera, No. 17.

Pacific Coast Lepidoptera—No. 17. On the Transformations of *Colias* (*Meganostoma* Reak) *Eurydice*, Bdv.

BY HENRY EDWARDS.

Some five years since I observed that the females of this rare and beautiful butterfly were in the habit of hovering over the singular Leguminose plant, *Amorpha californica*, Torrey, and upon one occasion, I thought I detected one in the act of laying her eggs, but the most careful search for such demonstration, though followed over the whole bush by the aid of a pocket lens, failed to establish the fact, and I believed that I had been deceived, and that the food-plant of the species must be sought for elsewhere. Two years ago, however, the same circumstances re-occurred, and in this instance, I noticed six different females alight upon bushes of *Amorpha*, and proceed as insects usually do in the process of the deposition of eggs. I again searched these bushes, and again without success, and I was led to the somewhat wild conclusion that the eggs are deposited at random, and allowed to drop to the ground at the base of the plant; the instinct of the parent trusting to the power of the

young larva to find its proper food, when, after its winter sleep, the plant should put forth its spring adornment. The *Amorpha* is particularly local, and not easy of cultivation, so I had no means of following up my observations, but by travelling some miles to the spots in which the plant happens to grow, and these being at a distance of from 30 to 100 miles from San Francisco, the opportunities afforded me were but few. Every season, however, I followed up the small trail which I had struck, and this year, I was fortunate enough to have my hopes of the discovery of the earlier stages of this charming species crowned with complete success, and at White Sulphur Springs, Napa Co., on the 7th of May last, I had the extreme gratification of seeing the caterpillar for the first time. Upon some plants of *Amorpha*, which very specimens I had carefully searched for five years, I found 19 examples in different stages of growth; and have since had the satisfaction of seeing all transform to the chrysalis state; and some few reach the imago. The species appears to be as delicate in physical habit as its colors are beautiful, and it feeds exclusively upon the plant on which it was originally found. I tried the caterpillars with *Psoralea*, *Astragalus* and *Hosackia*, among Californian plants, and with *Cassia* and *Swainsonia* among exotics, but it would eat none of them, and no matter how dry the leaves of its own food might be, it devoured them readily, and appeared to thrive. The result of my first experiment with this species has been as follows:

The full grown larvæ began to change to the chrysalis on the 9th of May, and by the 14th, all had gone into that stage; the first imago emerging on the 28th. I should add that in addition to the 19 nearly full grown larvæ which I brought successfully to the chrysalis state, I found four younger ones, two of which had scarcely passed the second moult, the other two being a little older. The whole of these, however, died soon after my reaching home. I have raised out of my 19 caterpillars, seven males and four females, seven of the remainder dying in the chrysalis stage from some singular disease. Without any mark to proclaim any kind of sickness, about the third or fourth day after the transformation, a livid spot appeared upon the base of the abdominal region, and in two days more this was extended to the whole surface. By the end of the 10th day, the chrysalis had assumed a blackish hue, and withered completely away, leaving only the dry husk to tell the tale. No parasite has emerged from these specimens, nor does it appear likely that any such event may happen, as the remaining specimen was infested by a large Dipterous insect, common to many species of Lepidoptera which has already produced its imago. I regret that a knowledge of the egg has so far escaped me, but I hope to be able to furnish this fact before the close of the year. Mr. R. H. Stretch was kind enough to make a figure of the larva and chrysalis, which will be published in Mr. W. H. Edwards exquisite work on the Butterflies of North America. In the meantime I offer the following description:

Larva. General color pale yellowish green. Head rather small, bluish green, with a few short hairs in front. Body entirely covered with minute black irrorations, with a faint indication of a pale dorsal stripe. There is a very distinct white lateral stripe, enclosing the spiracles, which are bluish white, and are surrounded by a yellow dash. Above the spiracles are ten well-

defined black spots, around which the irrorations are thicker, forming a black cloud. Under side entirely whitish green.

Length, 1.45 inch.

Food plant, *Amorpha californica*, Torr.

Chrysalis. Entirely pale yellowish green, surface slightly wrinkled, the dorsal region covered with white specks. Beak very sharp, and broadly keeled. Thoracic protuberance a long, acutely-edged ridge. The yellow dorsal line is visible as in the larva. When the imago is about to emerge, the wing cases assume a darker shade, until the pattern and color of the primaries of the perfect insect may be gradually but distinctly seen. After emergence, the chrysalis case is pure white, and very transparent and glossy.

Length, 0.95 inch.

Width across wing cases, 0.28 inch.

First imago appeared May 28th, the last on June 5th, the average time in chrysalis state being 19 days.

Professor Davidson read a continuation of his papers on "Irrigation in India, Egypt and Italy."

Mr. F. Gruber read the second of his course of lectures on ornithology, illustrating his remarks with specimens prepared by himself. This lecture treated particularly of "Birds of Migration and Song."

REGULAR MEETING, JUNE 19TH, 1876.

Vice-President Hyde in the chair.

Fourteen members present.

Donations to the Museum comprised a large gopher snake, from W. G. Blunt.

Mr. Dameron described a recent visit to Mt. Tamalpais, in Marin County, which caused some discussion concerning the peculiar mark on the side of the mountain.

REGULAR MEETING, JULY 17, 1876.

Vice-President Edwards in the Chair.

Twenty-five members present.

Donations to the Museum: From M. D. Hyde, vial of mud from soundings made from the "Tuscarora." From Henry Edwards, *Hyla*, sp., *Eulænia sirtalis*, *Allorchestes plumulosus*.

In the donations to the library was a volume of the "Botany of California," to which the Vice-President called particular attention. It is now published through the munificence of certain of our citizens, the State Geological Survey having been discontinued, and no money having been appropriated to publish this work. As Judge S. C. Hastings had been mainly instrumental in obtaining the money by means of which the publication of the work was insured, a vote of thanks to that gentleman was passed by the Academy.

W. N. Lockington submitted the following:

**Check List of the Decapod and Tetrdecapod Crustacea
of the West Coast of North America.**

BY W. N. LOCKINGTON.

The appended list contains 231 species, collected from the writings of Dana, Stimpson, S. I. Smith and Hale Streets, with the addition of above forty recently described by Mr. W. G. W. Harford and myself.

It is not unlikely that other Panaman and Arctic forms may have been described by American and European naturalists, whose works are not accessible to me; but I have worked in the belief that a check list was wanted, and that the only way to have one was to avail myself of the materials at hand—in the hope that those who have better materials, or more of them, will either be so good as to send me their additions or corrections, or will publish a fuller and better list.

Even if this list should prove complete, or nearly so, as regards species hitherto described, it probably does not contain the half of those actually existing on the long line of coast stretching from Panama to the Arctic Ocean.

Only the more conspicuous species from the coast north of Monterey have hitherto been described, while south of that old city, and extending almost to Panama, lies a vast region which, so far as I am aware, has scarcely been searched at all for Crustacea, though its birds, reptiles, fishes and mollusks have been pretty thoroughly studied.

Numerous Decapoda from Panama and Nicaragua have recently been described by S. I. Smith, and others by Hale Streets, yet the series of new forms given by them must be considered only as a sample of the riches of that region.

Even in and around San Francisco Bay we have found several new species of Tetradecapoda, and probably a systematic dredging would bring to light many more.

Very little dredging has been done along the coast, and that little has been confined to comparatively shallow depths.

The fresh-water streams and lakes of California, as well as those of Mexico, have yet to yield their quota of species for some future check list.

The Entomostraca and Cirripedia as yet described are very few, and these departments offer a large and inviting field to the naturalist.

It is my intention, from time to time, to furnish the Academy with additional notes of the species already known, as well as descriptions of such new species as may be sent to us.

Some few of the new species included in this list may, without doubt, prove to have been already described, but I feel assured that this will only be the case with Alaska forms, some of which may probably range throughout the Arctic Seas, inhabiting both North Pacific and North Atlantic.

The names of the naturalists who have described species are given in full throughout this list, with the exception of Stimpson, which is abbreviated to St.

The species at present in the collection of the Academy are denoted thus *.

DECAPODA BRACHYURA MAIOIDEA.

<i>Chionæetes Behringianus</i> .	St.	.....	In deep water.	Behring's Sts.
<i>Hyas latifrons</i> .	St.	.....		Behring's Sea.
<i>Hyas coarctatus</i> .	Leach.	.....		Behring's Sts.
<i>Hyas lyratus</i> .	Dana.	.....	In deep water.	Oregon.
<i>Herbstia parvifrons</i> .	Randall.	.....		"Western America."
* <i>Libinia? verrucosa</i> .	Lockington	.....		Mazatlan.
* <i>Loxorhynchus grandis</i> .	St.	.....		Santa Barbara.
<i>Loxorhynchus crispatus</i> .	St.	.....		San Miguel.
<i>Omalacantha hirsuta</i> .	Hale Streets	.....		Panama.
* <i>Inachus tuberculatus</i> .	Lockington	.....	
* <i>Pisoides? tumidus</i> .	Lockington	.....		San Diego.
* <i>Microrhynchus? Hemphillii</i>.		.....		San Diego.
<i>Libinia affinis?</i>	Randall	.....	Variety of <i>L. canaliculata</i> .	"Upr. Cala."
<i>Chorilia longipes</i> .	Dana.	.....		Oregon.
* <i>Scyra acutifrons</i> .	Dana.	.....		Puget Sd., San Diego.
<i>Othonia picteti</i> .	De Saussure	.....		Mazatlan.
<i>Mithraculus coronatus</i> .	St.	.....		Panama.
<i>Mithrax armatus</i> .	De Saussure	.....		Mazatlan.
* <i>Oregonia gracilis</i> .	Dana.	.....		Puget Sd.
<i>Oregonia hirta</i> .	Dana.	.....		Puget Sd.
* <i>Pugettia gracilis</i> .	Dana.	.....		Puget Sd.

REGULAR MEETING, JULY 17TH, 1876.

Vice-President Edwards in the Chair.

Twenty-five members present.

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In the donations to the library was a volume of the "Botany of California," to which the Vice-President called particular attention. It is now published through the munificence of certain of our citizens, the State Geological Survey having been discontinued, and no money having been appropriated to publish this work. As Judge S. C. Hastings had been mainly instrumental in obtaining money by means of which the publication of the work was insured, a vote of thanks to that gentleman was passed by the Academy.

W. N. Lockington submitted the following:

Remarks on the Crustacea of the Pacific Coast of North America, including a Catalogue of the Species in the Museum of the California Academy of Sciences, San Francisco.

BY W. N. LOCKINGTON.

The collection of Crustacea belonging to this institution is tolerably complete as regards the species inhabiting the Pacific Coast from Cape St. Lucas northwards, and also includes many forms from Oceania and the Indo-Pacific, but is deficient in Atlantic, African and Australian forms.

The Pacific Island specimens are, for the most part, the gift of Andrew Garrett; while those from this coast, to which these remarks are confined, have been presented chiefly by W. J. Fisher, Hy. Hemphill, Hy. Edwards and W. G. W. Harford.

MAIOIDEA.

The want of a good scientific library on this coast is severely felt by any one who attempts to describe a new species, and I have never felt it more acutely than when endeavoring to marshal in their proper places the numerous novelties belonging to this group of Crustacea that have been brought from the Gulf of California by Mr. W. J. Fisher.

Without type specimens of any of the European or Atlantic coast genera, with abridged descriptions of many genera, and nothing but incidental allusions to others, coupled by a reference to works inaccessible to me, the task of identification is a hard one, and I therefore crave indulgence if, in one or two cases, a new genus has been founded where an old one would have fitted, or a species has been described as new because I have not seen the description.

The total number of species of Maioid crabs now known upon this coast, including the *Parthenopidae*, two or three forms that may possibly be synonymous, and one, the locality of which is doubtful, is thirty-nine, of which nineteen only are included in Stimpson's "Crustacea and Echinodermata of the Pacific Coast N. A.," published in 1857.

Eleven new species are described in this paper.

FAMILY MAIIDÆ.

Sub-fam. INACHINÆ.

1. *Microhynchus* (*Inachus*) *tuberculatus*. Lockington. Proc. Cal. Acad. Sci. Feb. 7, 1876.

The rostrum in this species is entire, whereas in *Inachus scorpio* it is emarginate and shorter; moreover, the proportionate lengths of the second pair and the carapax are rather those of *Microhynchus* than of *Inachus* (as given by Dana.)

The present species does not appear to be very abundant, as Mr. Fisher obtained only two specimens on the West coast of Lower California.

No. 1. Two specimens, male and female, dried. San Diego. Hy. Hemphill.

2. *Chionoecetes Behringianus*. Stimpson. Crust. and Echinodermata Pac. Shores N. A., p. 8. At 80 fathoms, off Cape Romanoff.

PISINÆ.

3. *Hyas latifrons*. Stimpson. Prod. Animal. Evert. Ocean, Pac. Septen., 24.

Like *H. coarctatus* but with the body shorter, wider in front, less tuberculated above, and with obtuse angles; the rostrum shorter and less acute, and the fissure of the superior margin of the orbit closed.

Common in Behring's Straits.

The Cal. Acad. Sci. possesses a single specimen of this species.

No. 1a. Alaska, dried. W. J. Fisher.

4. *H. lyratus*. Dana. Crust. U. S. Ex. Exp. 1, p. 86, plate 1, fig. 1. Stimpson. Crust. and Echi. Pac. Shores N. A., 10.

Deep water on the coast of Oregon.

5. *H. coarctatus*. Leach. Malac. Pod. Brit. pl. XXI, b. Milne Edwds. Hist. Nat. des Crust. 1, 312. Brandt. Sibirische Reise, 1, 79. Stimpson. Crust. and Echi. Pac. Shores N. A., 10. Behring's Straits.

Herbstia parvifrons. Randall. Jour. Acad. Nat. Sci. Phil., VIII, 109. Gibbes, Proc. Amer. Assoc. for Advancement Sci., 170. Stimpson. C. & E. P. C. N. A.

Dr. Randall's description of this species is very imperfect. Stimpson and Gibbes give no description, but simply refer to the specimen in the Philadelphia Cabinet. "Western America, *Nuttall*."

It is not improbable that one of the species described further on may be identical with this.

7. *Platypes edentata*. Lockington. Proc. Cal. Acad. Sci., March 20, 1876. La Paz, 3 fms. Port Escondido, Mulege Bay. Mazatlan.

By an error in my original description, the "manus" of the first pair of limbs was stated to be alveolate on its upper edge. It is the merus that is alveolate. The extremely broad depressed appearance of the four hinder pairs is mainly due to the abundant tomentosity of their anterior and posterior margins, yet the limbs themselves are considerably flattened.

The first pair of limbs, in alcoholic specimens, are of a bright, shining carmine tint. The shape of the carapax is that of the *Pisina*, but the bifid rostrum renders its position doubtful.

No. 12. Female and two young specimens, dried. Mazatlan. Hy. Edwards.

No. 18. Male and female, in spirits. Gulf of California. Fisher and Lockington.

8. *Loxorhynchus grandis*. Stimpson. Crust. and Echi. Pac. S. N. A., 12.

Stimpson says of this species, "taken off the coast of California, near San Francisco." I have never heard of this crab in this locality, and it is never brought to market.

The Museum of the Cal. Acad. Sci. possesses two dried specimens, one, a male, from Santa Barbara, the other, a female, from Santa Catalina Island.

No. 10. Male. Santa Barbara. Mr. Lorquin.

No. 11. Female. Santa Catalina Island.

9. *Loxorhynchus crispatus*. Stimpson. Crust. and Echino. P. S. N. A., 13.

I have not seen this species.

10. *Homalacantha hirsuta*. Hale Streets. Proc. Acad. Nat. Sci. Phil., 1871, 238.

Panama.

Ala. nov. gen.

Rostrum bifid to base, deflected downwards; fixed joint of outer antennæ broad, the outer apex continued into a long spine in the same plane with the

rostrum. Antero-lateral teeth triangular, the two posterior forming a broad wing-like expansion.

The proper place of this genus is evidently among the *Pisinae*, and its affinities with *Rhodia* (Bell) and *Herbstia* (Edwards), but the form of the carapax and of the first joint of outer antennae does not agree with either, while from the former it differs in having the first pair slightly longer than the second; and from the latter (at least from *H. cordylata*), in the presence of a pre-orbital spine.

11. *Ala spinosa*. nov. sp.

Carapax with broad lateral expansions rendering it wider than long. Rostrum, bifid, shorter than the base of the external antennae. Movable basal points of antennae short. A long spine, exterior to the antennal base, projecting nearly as far forward as the rostrum. An acute spine on the upper anterior margin of orbit, and a much smaller post-orbital. Antero-lateral spines three, beside the post orbital; the second and third forming the wing-like expansions of the carapax. Of these, the second is the largest, and the third is short anteriorly, but has a long thin posterior border. Upper surface of rostrum with two rows of hairs. Ten tufts of hairs on the gastric and intestinal regions, corresponding to the tubercles of those surfaces. Postero-lateral and posterior margins of carapax with a row of tufts of hairs. Chelipeds of equal proportions in both sexes, very slightly longer than the second pair; arm tubercular above, carpus ditto, manus smooth and slender; dactyli in contact, in female, gaping in male; the parts in contact serrated on inner edge, extremities pointed. Hinder pairs beset with spines, each spine terminating in a bunch of hairs. Abdomen of female surrounded by a fringe of hairs.

Localities: La Paz, San José Island, Port Escondido, Gulf of California.

	♂ M. M.	♀ M. M.
Length of carapax	22	24
Width of " across lateral expansions.	23	26

Almost all the specimens are female, their abdomens laden with ova. They were taken in August or September.

No. 14. Male and female, in spirits. Fisher and Lockington.

12. *Pisoides? celatus*. nov. sp.

Carapax triangular ovate; branchial, cardiac and stomachal regions prominent, tumid; rostrum short, bifid to base; fossettes and inner antennae small; fixed joint of external antennae very broad, with a long spine as its outer exterior border, this spine forming part of the orbit. A spine upon the upper surface of the carapax slightly behind that of the fixed antennal joint, yet somewhat in advance of the eye, this (pre-orbital) spine divided by a triangular notch from the post-orbital, behind which, on the antero-lateral border, are two smaller spines. On each branchial region a group of two or three conspicuous spines, and some smaller ones on the posterior margins. The ciliate movable joints of outer antennae as long as rostrum, flagella about

three times as long as rostrum. Upper surface of carapax hirsute, especially upon the rostrum. Hinder part of sternum and abdomen tomentose. Chelipeds almost as long as second pair, without hairs; merus with about four teeth on its superior margin; carpus slightly tubercular; manus perfectly smooth. The movable finger occasionally has a tubercle between the base and the tip. Movable and fixed fingers serrated for half their length and interlocking on their outer margins. Hinder feet hirsute, short, a spine on the upper surface of the fourth joint of second and third pairs.

Color, reddish-brown above, the hands and under parts white, marbled with bright red, the latter predominating on the upper surface of the chelipeds.

Localities: La Paz, Mulege Bay, Port Escondido, San José Island, all in the Gulf of California.

It is found under stones at low tide, and was also brought up at La Paz by the dredge.

The females have no tubercle on the inside of the dactyli, and the spines upon the branchial region are not prominent. They were with ova when collected, in the month of August.

	♂ M. M.	♀ M. M.
Length of carapax	20	13
Width of carapax	17	12

The females are rather less elongated than the males. The carapax in both sexes is exceedingly overgrown with corallines, sponges, sertularia, etc.

No. 16. Two males and two females, in spirits. Fisher and Lockington.

This little crab evidently belongs to the *Pisinae*, but does not fit well into any of the genera given by Dana. The characters are nearest those of *Pisoides* and *Herbstia*, but from the former it differs in the presence of a pre-orbital spine, and from the latter in the great width of the fixed joint of the external antennæ, as well as in the small size of the chelipeds.

I think it not unlikely that this form is the *Herbstia parvifrons* of Dr. Randall, (Proc. Phil. Acad. Sci., 1869, p. 107), but his description is so short that it is impossible to be certain; so far as it goes, however, the characters given agree.

13. *Pisoides? tumidus*. Lockington, Proc. Cal. Acad. Sci., Feb. 6, 1876.

I have received specimens of this species from San Bartolomé Bay and Magdalena Bay, all of them smaller than the type in the possession of the Academy. Those from Magdalena Bay were dredged in three fathoms.

The first article of the external antennæ is acute on its outer angle, but can scarcely be called a spine, the second and third are long, ciliated, and cylindrical, in the last character differing from the generic description given by Dana.

No. 6. Female. San Diego, between tides. Hy. Hemphill.

LIBININÆ.

Libinia canaliculata? Say.

14. *Libinia affinis?* Randall. Jour. Acad. Nat. Sci., Phil., VIII, 107. Gibbs, Proc. Am. Asso., 1850, p. 170. Stimpson, Crust. and Echi. Pac. S. N. A., 14. Hale Streets, Proc. Acad. Nat. Sci., Phil., 1870 p. 170.

I have lately found among the crustacea collected by Mr. Fisher, two fine specimens of a *Libinia*, from San Bartolomé Bay, Lower California. They are much larger than the specimens described by Randall, and without tubercles interspersed among the spines. The species consist of a central dorsal row of eight, the first of which is the central one of a transverse row of three on the anterior portion of the gastric region. Two of the dorsal row belong to the cardiac, and one to the intestinal region. Nearly in a direct transverse line with the first cardiac spine are two others on each branchial region; and in a direct transverse line with the second cardiac spine are a blunt spine or tubercle and two spines on each branchial region, thus forming a row of seven. Right and left of the intestinal spine is a small one on the posterior part of each branchial region. Rostrum but slightly cleft, setose at extremity and on upper surface, not at all deflected; ante-orbital spine much smaller than post-orbital, which is broad and curved posteriorly; two spines on each antero-lateral margin, and two smaller ones near together on each hepatic region, in a line between the anterior antero-lateral spine and the transverse row on the stomach. The outermost spine of the transverse row of seven is the largest. The feet are without spines or tubercles. The largest specimen measures as follows:

	M. M.
Length of carapax	52
Width of carapax, without measuring the spines.....	39

Both the specimens are female.

I have never seen a specimen of *L. canaliculata*, nor Randall's specimen of *L. affinis*, but it is unusual to find an Atlantic species existing unaltered at such a point as San Bartolomé Bay, remote both from the Isthmus of Panama and from Behring's Straits, and for this reason I should not be surprised if it should prove distinct, in which case I propose for it the specific name *setosa*, on account of its setose rostrum.

MICIPPINÆ.

15. *Micippa ovata*. nov. sp.

Carapax ovate, truncate in front, front narrower than in *M. hirtipes*, Dana. Post-orbital spine in the same line with pre-orbital, the two separated by a triangular notch. Antero-lateral margin with five sharp spines directed forwards, excluding the post-orbital, the lateral edge of which is elongated. Upper surface of carapax arched transversely, almost semicircular in section; tubercles numerous, but without spines. Chelipeds short, smooth, fingers serrate at tip. Hairs sparsely scattered on hinder feet and carapax, rostrum pilose, especially round the margin.

Localities: Port Escondido, Mulege Bay, Los Angeles Bay, San José Island, La Paz.

	♂	♀
	M. M.	M. M.
Length of carapax.....	21	19
Width of carapax at third antero-lateral spine	18	16
Length of first pair	19	12.5

Var. *lævis*.

Rostrum, orbits, antero-lateral spines, and limbs exactly as previously described, but the carapax more broadly ovate, and without tubercles, and the chelipeds much larger in the male.

	M. M.
Length of carapax.....	21
Greatest width at fourth antero lateral spine.....	19.5
Length of first pair.....	30

This is a well-marked species, and exceedingly elegant in appearance. The male which I have described as var. *lævis* is the largest among several from various localities. The smooth carapax and large chelipeds render it conspicuous among the others, yet I am inclined to believe these characters only varietal, and not improbably only individual.

No. 20. Male and female, in spirits. Gulf of California. Fisher and Lockington.

CHORININÆ.

16. *Chorilia longipes*. Dana. U. S. Ex. Exp., 1, p. 81, pl. 1, fig. 5. Stimpson. Crust. and Echi. Pac. S. N. A., 14.

17. *Scyra acutifrons*. Dana. U. S. Ex. Exp., vol. I, p. 95, pl. 11, f. 2 Stimpson. Crust. and Echi. P. S. N. A., 15.

No. 7. A single dried specimen from San Diego, by Henry Hemphill, caught between tides.

Chorilibinia. nov. gen.

Rostrum long, broad, and emarginate at tip as in *Libinia*, but the eyes concealed beneath it as in *Chorinus* and its allies. Pre- and post-orbital spines acute, separated above and below by an acute fissure, and together constituting the orbit. Carapax triangular.

18. *Chorilibinia angustus*. nov. sp.

Carapax triangular, narrowing gradually to the region of the eyes, the orbits of which are salient. Rostrum long, emarginate at tip, the bifurcation divergent, extending only one-third the length of rostrum. Fixed joint of external antennæ terminating outwardly in a long spine which precedes the pre-orbital when looked at from above. Pre-orbital spine large, acute, separated from the acute post-orbital by an acute fissure, both above and below. Antero-lateral margin with three spines beside the post-orbital, the largest spine at the angle between antero- and postero-lateral margins. Tubercles of carapax prominent, each culminating in a single spine. A tubercle with spine on the posterior angle. Movable basal joints of outer antennæ setose, slender, cylindrical. Chelipeds slender, about the same length as second pair; merus (arm) with four tubercles above; manus smooth, slender; dactyli small, slender, in contact most of their length, serrate on inner border. Four hinder pairs rounded, slender, second much the largest; claws sharp.

The whole of the upper and under surface, except the inner side of the hand and upper surface of the rostrum, tomentose, with longer hairs at intervals, and a row of the latter on each side of the rostrum.

Locality, Gulf of California.

	♂ M. M.	♀ M. M.
Length of carapax	20	23 *
Greatest width of carapax	12	15

Out of the three specimens in my possession the female is the largest, but has the rostrum shorter than the males.

19. *Othonia picteti*. De Saussure, Revue et Magasin de Zoologie, V, 357, pl. XIII. f. 2.

MITHRACIDÆ.

20. *Mithrax armatus*? De Saussure, Revue et Magasin de Zoologie, V, 335, pl. XIII, f. 1.

Either this species or the succeeding is most probably the *M. armatus* of De Saussure, but for the reasons given more fully under the next species, I cannot be certain of its identity, and therefore subjoin a description.

Rostrum bifid, the horns not lamellate; carapax broadly pyriform; verrucose throughout its upper surface, the verrucæ becoming spinose on the posterior portion of the carapace. Exterior side of the fixed joint of outer antennæ with a long spine at the extremity, followed by a shorter. A short pre-orbital spine, separated by a deep notch from the post-orbital. Margin of carapace with five large spines besides the post-orbital, four upon the antero-lateral, the fifth upon the postero-lateral margin. A second row of smaller spines upon the sub-branchial region. First pair of limbs short; dactyli not tapering, obtuse and imperfectly spoon-shaped at end; propodus oblong, more than twice as long as wide, smooth; carpus and merus spinose above, but without the smaller tubercles found on the carapax. Four hinder pairs slender, cylindrical; merus and carpus spinose above like those of first pair; propodus slightly hirsute, smooth; terminal joint (dactylus, tarsus) hirsute, ending in a recurved claw of an orange color. Abdomen six-jointed in the female. The whole of the upper surface of carapax and limbs, between the spines and tubercles, is finely punctate; and the whole of the lower surfaces tomentose.

A single female from Mazatlan, presented by Hy. Edwards, is the only specimen I have seen of the species.

	M. M.
Length of carapax to tip of rostrum	32
Width of carapax from tip to tip of fourth marginal spine	30
Length of first pair	28
Length of second pair	32

Color of the specimen a light flesh tint.

No. 3. Female, dry. Mazatlan. Hy. Edwards.

21. *Mithrax areolatus*. nov. sp.

The only species of *Mithracinæ* that have been, to my knowledge, previously described from this coast are the *Mithrax armatus* of De Saussure, and the *Mithraculus coronatus* of White and Stimpson.

De Saussure's description is not accessible to me, and the only mention I have of the species is in Stimpson's Crust. and Echi. Pac. Shores N. A., where the reference is given, and the locality (Mazatlan) of the specimen in the Mus. Phil. Acad.

Mithraculus coronatus finds a place in the "Catalogue of Crustacea from the Isthmus of Panama, collected by J. A. McNeil," by T. Hale Streets, but that author does not state from which side of the Isthmus his specimens came. I find the same species in S. I. Smith's "Brazilian Crustacea," from which I infer that it is not unlikely McNeil's specimens were from Aspinwall.

Dana says of *Mithrax*: "*Articulus antennarum externorum Imus apice externo, duabus spinis longis armatus*," but the antennal spines in *M. dichotomus* of the Mediterranean are very short, as they are in the present form. *Mithraculus*, however, is stated by Dana to be without long antennal spines.

As the antennal spines in this species are evident, but are rather teeth or lobes than spines, I assume that I have before me either De Saussure's *Mithrax armatus* or a new species—most probably the latter, more especially as, besides the doubtful locality, the proportions of the carapax given by S. I. Smith for his specimens of *Mithraculus coronatus*, do not agree with the present species, which has the length and breadth more nearly equal. I subjoin a short description:

Carapax almost orbicular, slightly wider than long; front four-lobed, the pre-orbital teeth projecting almost level with the two central lobes which constitute the rostrum. Fixed joint of outer antennæ with two obtuse teeth on its outer apex. Antero-lateral margin with five teeth, including the post-orbital, third tooth largest.

Regions of carapax very distinct and subdivided into areolets answering to those of the *Xanthinæ* and *Chlorodinæ*; areolets with punctate surface, without spines or teeth, and almost free from hair. Merus and carpus of first pair with spinose tubercles, hand smooth, cristate above. Those of female similar but smaller. Posterior feet beset with spines on their exposed surfaces, and densely pilose.

	♂	♀
	M. M.	M. M.
Length of carapax.....	16	13
Breadth of ditto.....	18.5	15

Localities—Port Escondido, San José Island, Gulf of California. Found at low tide under stones and coral. Color, in spirits, light red.

If this species should prove to be new, I propose to name it *Mithrax areolatus*. The females, when collected in the month of August, were loaded with ova.

No. 13. Male and female, in spirits. Gulf of California. Fisher and Lockington.

Fisheria. nov. ger.

Carapax orbiculo-ovate, depressed, with short preorbital and post-orbital spines. First joint of outer antennæ wide, terminating outwardly in a long spine, which is followed by three others, which form the inferior margin of the orbit. Chelipeds of male, $2\frac{1}{2}$ times the length of carapax; those of female shorter than the second pair. Fingers serrate, obtuse and imperfectly spoon-shaped at tip.

This genus is evidently nearly allied to *Mithrax*, but the great length of the first and second pairs of limbs in the male, as compared with the carapax, and the row of teeth on the external margin of the fixed antennal joint, appear to necessitate its separation. The general aspect of the single species here described is totally different from that of *M. dichotomus* or *M. asper*, which are the only two species I have seen figured.

22. *Fisheria depressa*.

Male—Carapax depressed, widely pyriform, the regions marked by slight elevations granulated on the summit, the margins and spaces between the elevations somewhat tomentose. Rostrum bifid, short, reaching to the centre of the terminal joint at base of outer antennæ. A long spine at the external angle of the fixed joint of outer antennæ, succeeded by three smaller spines. Movable base of outer antennæ as long as flagellum, second joint largest, second and third joints slender, cylindrical.

Upper surface of carapax almost spineless, margins and orbits spinous. Orbit with two teeth above and four acute spines below, the two anterior of which belong to the fixed joint of antennæ. A row of teeth on the hepatic region, continued outwards from the maxillipeds.

Chelipeds of male enormously long, ischium produced into an acute spine on its anterior border; meros rounded, as long as post-rostral portion of carapax, beset with acute spines on its upper surface; carpus short, tuberculated; manus slightly longer than entire length of carapax (measuring to the end of the fixed finger); entirely smooth, compressed and broad, with rounded upper and lower edges; dactyli gaping, their obtuse ends imperfectly spoon-shaped and serrated, movable finger with a tubercle at half its length on inner border. Second pair $1\frac{1}{2}$ times as long as carapax, meros similar to that of first pair, with a row of about ten long spines on its upper surface, and a single spine on the distal extremity of its lower; carpus with a few spines; propodus very slender, entirely unarmed. Three hinder pairs similar to second pair, all with a single spine at distal end of underside of meros. Four hinder pairs sparsely hirsute above.

	M. M.
Length of carapax.....	27
Width of ditto	24
Length of first pair.....	68
Length of manus of ditto.....	33
Length of second pair.....	42
Length of fifth pair.....	33

These measurements are taken from the largest of six male specimens from Port Escondido, Lower California.

Female—Carapax as in male. Chelipeds shorter than second pair, fingers less widely gaping, no tooth on movable finger. In other respects as in male.

	M. M.
Length of carapax.....	21
Width of ditto.....	18
Length of first pair.....	24
Length of second pair.....	29

These dimensions are taken from the largest of eight specimens from Port Escondido and San José Island, Gulf of California.

Color, in spirits, bright red, the smooth manus, undersides of legs, and buccal apparatus especially bright.

No. 21. Male and female, in spirits. Fisher and Lockington.

23. *Mithraculus triangulatus*. nov. sp.

Carapax as broad as long; in form an acute isosceles triangle truncated in front; regions prominent, antero-lateral margin with three lobes. Rostrum very short, bifid, scarcely projecting beyond the line of the fixed joint of the outer antennæ, which terminates in a blunt tooth, followed by a second tooth or rather lobe, forming part of the lower margin of the orbit. Outer antennæ ciliate, movable basal joints cylindrical, short; second joint considerably stouter than the third. Lower margin of orbit formed by the teeth belonging to the fixed antennal joint, followed by a small tooth intervening between them and the post-orbital. Pre-orbital tooth scarcely evident, forming the obtuse termination of the elevated orbital region.

Chelipeds stout, longer than the second pair by almost the length of the hand, arm tubercular above, hand and carpus smooth, the former broad and heavy, stouter than the arm; dactyli obtuse and spoon-shaped at end, the movable one with a single tubercle on the inner margin.

Hinder limbs tubercular on upper surface; carapax and chelipeds without tomentosity, but a few hairs scattered on the hinder limbs. Females much smaller than males; the chelipeds small, about equal in length to the second pair.

Locality—Gulf of California.

	♂ M. M.	♀ M. M.
Length of carapax.....	16	13.5
Length of first pair.....	27	11.5
Length of second pair.....	15	12
Width of carapax across the posterior portion, where widest...	14	12

The areolets of the carapax are prominent, but without spines; but the two largest posterior lobes of the antero-lateral margin are tubercular, and there are a few small tubercles on each postero-lateral margin.

Color, in spirits, uniform reddish.

No. 15. Several specimens, both sexes, in spirits. Fisher and Lockington.

24. *Mithraculus coronatus*. Stimpson. Amer. Jour. Sci., second ser., XXIX, 1860, p. 132; Am. Lyc. Nat. Hist., New York, VII, p. 186; White (?), List. Crust. Brit. Mus., p. 7; T. Hale Streets, Proc. Acad. Nat. Sci., Phil., Dec. 5, 1871, p. 239.

This species is mentioned by Hale Streets in his "Catalogue of Crustacea from the Isthmus of Panama, collected by J. A. McNeil," but that author does not state whether the specimens were from the Pacific or Atlantic shore of the Isthmus. It is found at Aspinwall and along the Brazilian coast.

TYCHIDE.

25. *Tyche brevipostris*. Nov. sp.

Carapax an elongated rectangle with sinuate sides; rostrum short, depressed; laminate; pre-orbital spine long, elevated, produced almost as far forwards as the rostrum when viewed from above. A thin broad lobe behind the pre-orbital spine, concealing the elongated eyes except at the tip. Fixed joint of outer antennæ narrow, and boldly relieved from the surrounding parts, second and third joints cylindrical. Peduncles of eyes inserted level with the fixed joint of antennæ. Anterior portion of carapax bent downwards, posterior portion shield-shaped, the lateral and posterior margins overhanging, the latter thin. First pair of limbs shorter than second, scarcely projecting beyond the carapax. Second pair about as long as carapax, slender; succeeding pairs similar.

	M. M.
Length of carapax.....	17
Width of ditto	11

A single female specimen from Port Escondido, Gulf of California.

The general aspect of this little crab is that of a dried leaf; the anterior portion, deflected and somewhat pilose, does not attract the eye, while the shield-shaped posterior portion is very conspicuous. From the central tubercle of the gastric region, which is the most elevated portion of the carapax, a ridge is continued outwards on each side to the margin of the carapax, the surface of which is increased by expansions with sinuate edges. The whole of this leaf-like posterior surface is inclined in the opposite direction to the frontal portion. The pre-orbital spines project like a pair of horns immediately in front of the eye-shields, each of which is an obtuse isosceles triangle with its apex directed laterally.

As the specimen is a female it is impossible to be certain whether the small chelipeds are characteristic of the species, or of the sex only. I have placed this species in the genus *Tyche* of Bell, with which it has the following characters in common: Eyes without orbits, hiding below the carapax, which is oblong, wide in front and broad across the orbits, depressed, without post-orbital spines, and with pre-orbital spines produced to a line with the rostrum; first joint of external antennæ long, unarmed.

This form differs, however, from the generic description as given by Dana, in the shortness of the rostrum, which is bent downwards, but not more so than the anterior portion of the carapax.

EURYPODIDE.

26. *Oregonia gracilis*. Dana. U. S. Ex. Exp., I, 106, pl. III, f. 2. Stimpson, Crust and Echi. Pac. S. N. A., 16.

27. *Oregonia hirta*. Dana. U. S. Ex. Exp., I, 107, pl. III, f. 3. Stimpson. Crust. and Echi. Pac. S. N. A.

Both the *Oregoniæ* are found in deep water. Locality, Puget Sound. I have not seen either of these species.

28. *Leptopodia debilis*. S. I. Smith. Rep. Peabody Acad. Sci., 1869. Panama, Pearl Islands.

A single specimen of this species was found in Mr. Fisher's collection, from the Gulf Coast of Lower California.

29. *Inachoides (Microrhynchus) Hemphilli*. Lockington. Proc. Cal. Acad. Sci., February 7, 1876.

I have been in some doubt whether to refer this species to *Inachoides* or *Microrhynchus*, but as the eyes are tolerably elongated and do not appear to be retractile within the small orbits, I prefer the former. On the other hand, it differs from both genera in the absence of a post-orbital spine, unless a single spine on the antero-lateral margin, situated almost the length of the rostrum behind the eyes, can have a right to that name. The rostrum is one-fourth the length of the posterior portion of the carapax. The want of a post-orbital spine scarcely warrants the establishment of a new genus, but the definition of the genus *Inachoides* must, to admit it, be altered slightly, thus—

Inachoides. Edwds and Lucas. Carapax valde gibbosus rostro longiusculo, aculo, spina post-orbitali parva aut nulla. Pedes 8, postici sat longi, gracillimi. Articulus antennarum externarum Imus angustus.

The words *aut nulla* admit the present species. Localities—San Diego, San Luis Obispo, both in Upper California; La Paz, where it has been dredged from a bottom of sand and mud; San José Island; Amortiguado Bay; Port Escondido; Mulege Bay—all in the Gulf of California. The largest specimen I have seen, a male, exceeds in size the type in the possession of the Academy. The dimensions are as follows:

	M. M.
Length of carapax, including rostrum.	34
Greatest width of ditto	13
Length of first pair.	40
Length of second pair	70

One of the largest females measures 15 m. m. in length and 8 in width. The carapax of this species is free from the parasitic growth, often so abundant on maoid crabs.

- No. 2. Male, San Diego, 7 fms. Hy. Hemphill.

30. *Inachoides brevirostrum*. nov. sp.

Carapax pyriform, the regions in the central line of the body more elevated than the lateral regions. Rostrum short, simple, consisting of the spinous termination of the septum dividing the fossettes of the inner antennæ. Opposite the anterior extremity of each fossette an acute tooth, so that the ros-

trum is somewhat trifid. Eyes long, not retractile. A small pre-orbital spine. Fixed joint of external antennæ prolonged externally into a short but acute spine; movable joints not concealed under the rostrum. First pair of feet shorter than the second in the male, than the third in the female; slender, cylindrical, the dactyli straight, in contact throughout their whole length, and almost equal in length to the manus. Four hinder pairs slender, cylindrical, the second rather more than $1\frac{1}{4}$ times the entire length of the carapax. Carapax and abdomen tomentose, chelipeds tomentose, four hinder pairs ciliate, sides of rostrum ditto. Locality, Magdalena Bay, L. C.; dredged at a depth of three fathoms. Four females and one male.

	♂
	M. M.
Length of carapax.....	9.5
Width of ditto.....	6.

The females are wider in proportion than the males. Notwithstanding the comparative shortness of the rostrum, and also of the carapax, the characters of the eyes and antennæ prove this species to be an *Inachoides*.

PERICERIDÆ.

PERICERINÆ.

31. *Pugettia gracilis*. Dana. U. S. Ex. Exp., I, 117, pl. IV, f. 3. Stimpson. Crust. and Echi. Pac. S. N. A., 16.

Localities—Puget Sound, Vancouver's Island; Mutiny Bay, Alaska; San Luis Obispo.

No. —. Male, in spirits, Vancouver's Island.

No. 19. Female, in spirits, Mutiny Bay, Alaska. Presented by Alaska Commercial Company.

32. *Pugettia Richii*. Dana. U. S. Ex. Exp., I, 117, pl. IV, f. 4. Stimpson. Crust. and Echi. Pac. S. N. A., 17.

The only locality at present certainly known for this crustacean is San Diego. Dana says of his specimen, "From California."

No. 9. Several dried specimens from San Diego. Henry Hemphill.

33. *Pellinia longiocularis*. nov. sp.

Posterior portion of carapax broadly triangular, post-orbital spine expanded, trans-orbital width rather less than half the greatest width; rostrum short, stout, bifid. Stomachal region prominent. Fixed joint of external antennæ emarginate at apex, the outer tooth acute, not longer than the inner. Peduncles of eyes about equal in length to the distance between the eyes. First pair of feet about equal in length to the second and to the length of the body; meros tuberculate; hand thin, broad, smooth, marbled; fingers touching at the extreme tip only; a tooth on the inside of the movable finger near its base.

Four hinder pairs short, slender, cylindrical, setose, except the tarsus, which is smooth and shining, like the manus of the first pair. Carapax and abdomen tomentose above and below. A single specimen, male, found among a number of another species from different localities, so that its locality is uncertain, further than that it is from Lower California. Length and breadth nearly equal, about eight millimetres.

This species differs from *Peltinia*, Dana, in the length of the eyes. The antennæ are not hidden by the rostrum, so that it is impossible to place it among the *Epialtineæ*. It appears to me to be in its characters intermediate between *Acanthonyx* and *Epialtus*, and therefore should find a place in *Peltinia*, but to accommodate it the character, "*Eyes not retractile, short*," must be changed to "*Eyes not retractile, of variable length*."

EPIALTINÆ.

34. *Epialtus productus*. Randall. J. A. N. S. Phil., VIII, 110. Gibbes. Proc. Am. Asso., 1850, p. 173. Dana. U. S. Ex. Exp., I, 133, pl. VI, f. 2.

The figure in Dana's work represents the female, which differs so much from the male that it might easily be mistaken for a distinct species. The largest specimen in this collection is a male from Santa Rosa Island, Cal., collected and presented by W. G. W. Harford. This specimen displays well the differences between the sexes. It is armed with a large pair of chelipeds, the hand and fingers of which equal in length the breadth of the carapax. The four hinder pairs of legs are long and slender, and the carapax in all its dimensions greatly exceeds that of the female.

No. 4. Male, fine specimen, dried. Santa Barbara, W. G. W. Harford.

No. 5. Female, dried. Donor unknown.

35. *Epialtus Nuttallii*. Randall. *loc. cit.*, VIII, 109, pl. III. Gibbes. *loc. cit.*, p. 173.

It is rather strange that this crustacean should not have found its way into our collection. Randall gives "Upper California" as its locality.

36. *Epialtus minimus*. Lockington. nov. sp.

Rostrum larger than usual in the genus, the emarginated extremities divergent. Trans-orbital width small. No pre-orbital or post-orbital spine. Antero-lateral margin with two triangular teeth, the anterior much the largest, their front margin at right angles to the carapax. Without the anterior of the teeth, the form of the carapax would be triangular. Distance from the anterior line of the first teeth to tip of rostrum about equal to the posterior portion of the carapax. First pair of feet in the male longer than the second, fingers obtuse and imperfectly spoon-shaped at their tips. Eight posterior feet slender, cylindrical, naked, except terminal joint, which is fringed below with short setae. Penultimate joint with one or two small spines on

the under side. Localities—Port Escondido, San Jose Island, both in the Gulf of California. Found at low tide under stones and in coral.

	♂	♀
	M. M.	M. M.
Length of carapax.....	14	14
Width of ditto.....	11	12
Length of first pair.....	18	..

The carapax of the largest female is stouter and broader than that of the largest male, but the latter more than makes up for this deficiency by the extra length of his chelipeds. In some of the females the manus is tuberculated, but is smooth in the males and in other females.

No. 17. Male and female, in spirits. Fisher and Lockington.

PARTHENOPIDE.

37. *Parthenope (Lambrus) punctatissima*. Owen. Zool. Beechey's Voyage, 81, pl XXIV, f. 4. Stimpson. Crust. and Echi. Pac. S. N. A., 18.

38. *Lambrus frons-acutis*. Lockington. Proc. Cal. Acad. Sci., Feb. 7th, 1876.

From Boca de Los Piedras, Sinaloa, Mr. W. J. Fisher brought two small specimens.

No. 8. Santa Catalina Island. Hy. Hemphill (dried).

39. *Cryptopodia occidentalis*. Dana. Am. Jour. Sci., 2d ser., XVIII, 430. Gibbes. Proc. Elliott Soc. Nat. Hist., Charleston, S. C. Stimpson. Crust. and Echi. Pac. S. N. A., 18.

Dr. Kellogg read the following paper:

Ludwigia Scabriuscula.

BY DR. A. KELLOGG.

Stem annual, erect, branching from the base, somewhat scabrous throughout, slightly decurrent-angled; leaves opposite—upper small ($\frac{1}{4}$ -inch long; one or more lines wide), sessile, oblong-linear acute; base subclasping margin entire, or obsoletely toothed and scabulose; flowers axillary, sessile or subsessile, solitary or clustered—six to nine or more in a whorl involving the stem; petals whitish, obovate-cuneate; claw short, nearly as long as the capsule—two to three times the calyx; stigma, four-lobed and capitate, style twice longer than calyx; capsules, ovoid, subquadrangular, angles slightly marked (eight-angled chiefly near the truncate apex; the four intermediate angles often processed into obsolete secondary teeth). Seeds obovate, minutely roughened and very obtusely striate; reddish brown. Muddy margins of streams and lakes; spicate fruited throughout main stem and branches. The lower leaves are wanting in several collections; intramarginal veins exceedingly obscure in the upper lesser leaves.

W. N. Lockington read the following:

Remarks upon the various Fishes known as Rock Cod.

BY W. N. LOCKINGTON.

Probably the most abundant fish in our markets are those known as rock cod. At least seventeen species are thus called, eleven of them belonging to Cuvier's genus *Sebastes*, four to *Chiropsis*, and those others to as many separate genera.

In 1854, and the subsequent years, as will be found by reference to the first volume of the "Proceedings of the California Academy of Sciences," the distinguished ichthyologist, W. B. Ayres, described eight species of *Sebastes*, besides a large number of other fishes—about sixty-eight in all. Of the eleven species of *Sebastes* described by Ayres and Girard, we have within these last two months found in the markets all but three, viz: *S. nigrocructus*, Ayres; *S. elongatus*, Ayres; and *S. ovalis*, Ayres. The first of these, distinguished by several black bands across its body, is well known to the fishermen; of the second, which is characterized by its elongated body and light yellowish brown color, with blackish brown spots, the Academy possesses a specimen; but I have not yet seen the third, and Dr. Ayres himself states that it is rare.

S. ruber. Ayres. This species attains a large size and a weight of from ten to twelve pounds. It is of an almost uniform bright red, with a great abundance of small accessory scales on the large ones.

S. helvomaculatus. Ayres. This rosy-tinted fish may readily be distinguished from *S. ruber* and *S. rosaceus*, not only by its much smaller dimensions, but also by the row of three bright pink spots which adorn each flank. It does not appear to exceed a foot in length. In the month of June it was frequently brought into our markets.

S. rosaceus. Girard. About this species there is still some ambiguity, and it is not unlikely that two distinct forms are confounded under this name. The name was first applied by Girard to a large species of *Sebastes* figured in the P. R. R. Rep., vol. x, pl. xxii, and incorrectly supposed by that naturalist to be the same with the *S. ruber* of Ayres. Girard's figure is in many respects faulty, and in his description he refers to an error in the form of the caudal fin, which is drawn rounded, while in the fish it is sub-concave. The outline figure given by Ayres at Pro. Cal. Acad., vol. ii, fig. 62, is more correct, but Ayres gives no description. As I have lately had the advantage of handling several specimens, I think it may be well to notice a few particulars, some of which are not mentioned by Girard. The ventral fins are long and pointed, nearly equaling the pectorals, and extending beyond the vent; the pectorals also are long and pointed, the longest rays extending to within four scales of

a perpendicular drawn from the first anal spine; and the rays of both these pairs of fins are slim and delicate.

The second spine of the anal fin is stoutest, but is shorter than the third; the first soft rays of the anal are very long, much exceeding the posterior rays, and extending to the origin of the exterior rays of the caudal; and the caudal fin is most distinctly sub-concave, with the line of the outer fin rays continued forward as a ridge for some distance along the caudal peduncle. The two lower spines of the pre-operculum are more developed than in Girard's plate, and the spinous dorsal is more correctly shown in Ayres' outline figure. Ayres has, however, omitted the characteristic broad short spine situated directly over the centre of the maxillary.

Girard gives his *S. rosaceus* "two pairs of small and horizontal spines" upon the upper surface of the head. The specimens we examined were provided with five pairs of spines, none of them very conspicuous. There are two long, low, orcipital spines, between which and the eyes are three pairs of very small spines; a fourth pair (supra-orbitals) occurs on the extreme edge of the upper margin of the orbit, above the pupil; the space between the eyes is unarmed, and the fifth pair is situated between the nostrils.

Girard gives the color as "a uniform reddish or crimson tint, lighter beneath than above," characters which agree with *S. ruber*. *S. rosaceus* is far from uniform in tint when fresh, the upper portion of the head and back being extensively blotched with a darker red than the ground tint, inclining to brown. In view of all these differences, I think it not improbable that Girard's figure may be that of another species which I have not yet seen, in which case Ayres' species would no longer be *rosaceus*, and might fitly be named *S. Ayresii*. I may here mention that I have had a large specimen brought to me from deep water, and presenting several differences from the typical *S. rosaceus*, but, as it is deformed about the jaws and dorsal fins, I think it best at present to include it under that species.

S. nebulosus, Ayres, is a tolerably common fish in our markets, and is perhaps one of the most beautiful of this gorgeously colored genus of fishes, adorned as it is with yellow bands and blotches upon a dark, almost black, ground. The largest specimen in the collection of the Academy is eleven inches long, but has a girth of nine inches and a half; this species being one of the stoutest and deepest of the genus. I subjoin measurements of another specimen which came into our hands:

	Inches.
Length.....	11
Length of head.....	3
Girth in thickest part.....	10.2
Length of spinous dorsal.....	4
Length of caudal fin.....	2
Length of pectorals	2.5

S. paucispinus. Girard. This is one of the most singular fishes of the genus, its lower jaw reaching forward and upward so much that the tip of the mandible continues around the cone of the dorsal outline. This species is far

from common. Following are the dimensions of a specimen recently presented to the Academy:

	Inches.
Total length	5.3
Length of head	4.8
Length of spinous dorsal	4.5
Length of caudal	3
Length of ventrals	3
Length of lower jaw	3.5
Girth in thickest part	3.7
Diameter of eye	1

S. melanops. Girard. In the month of June this species was abundant in the markets. It is a sober-colored fish, attired in black and gray, the black in varying proportions upon the lighter ground; and in size it is usually superior to *S. ruber* and *S. rosaceus*.

S. flavidus. Ayres. This species is not so uncommon as Ayres believed it to be when he described it. During June of this year it was nearly as abundant as *S. helvomaculatus*, *S. melanops*, or *S. auriculatus*, and more so than either species of *Sebastes*. It is readily distinguished by the greenish brown and yellowish green tints of the back and sides, as well as by the third spine of the anal fin, which is longer than the second, instead of about equal to it, as in *S. melanops*, which is a closely allied form. The largest specimen seen by us measured as follows:

	Inches.
Total length	15.5
Length of head	4.2
Length of spinous dorsal	4.2
Length of caudal	3
Girth in thickest part	10
Diameter of eye	1

S. auriculatus. Girard. This fish can always be distinguished by a black mark upon each of the gill-covers, very obvious in the younger fish, and sufficiently distinct, though less clearly outlined, in older specimens. The general color is a dull reddish brown, with cloudings of a darker tint upon the back and sides; these cloudings, like the black spot before mentioned, becoming more diffused and indistinct with increasing size and age. This appears to be the only species of *Sebastes* which frequents the Oakland side of the bay, where it is very commonly taken with hook and line from the railway wharf. The bay upon the Oakland side is less saline than at San Francisco, the influx of the tide damming up the fresh waters of the Sacramento and other smaller rivers and creeks, and throwing them toward the main-land. Many of the marine fishes, therefore, do not visit this side, while salmon are frequently taken there. A large *S. auriculatus* measured as follows:

	Inches.
Length.....	16.5
Depth at origin of first dorsal.....	4.7
Length of dorsal.....	8.5
Length of head.....	4.3

Anarhichthys felis. Girard. This rapacious fish, a near relative of the wolf-fish of the Atlantic, attains a large size. One obtained recently in the market measured four feet nine and a half inches from snout to tip of caudal fin, and one of larger dimensions was received by the Academy last year, but was lost for want of a vessel sufficiently large to contain it in spirits. The specimen described by Girard was only fifteen inches long. Some few weeks ago I saw in the papers an item detailing how some one in the north of this State had found an "infant sea-serpent" seven feet long, with a long fin on the back and another below, both reaching to the tail, a conical head and large teeth, etc. The description was, in fact, a tolerably correct one of a specimen of this fish of about the size of that sent to the Academy. It is not very common, but is occasionally brought to market, and is eaten by the Chinese.

REGULAR MEETING, AUGUST 7th, 1876.

Dr. A. B. Stout in the Chair.

Sixty members present.

Donations to the Museum: From Capt. H. Johnson, ovary of viviparous perch, larva of *Prionus Californicus*. From J. P. Dameron, specimen of *Gillichthys mirabilis*. From Wm. J. Fisher, specimens of *Conorhynchus*, *sphyræna*, *argentea*, *Tetraodon polita*, *Mustelus Californicus*, *Trachynotus ovatus*, *Paralabrax nebulifer*, *Sasmicossiphus pulcher*, *Argyreiosus Pacificus*, *Gelasimus princeps*, *Grapsus strigosus*. From J. M. Middleton, five specimens of cinnabar from Sulphur Banks, Lake County. From Henry Edwards, one specimen of silver ore from Austin, Nevada, five specimens crystals of cinnabar from interior of chimney of furnace, Lake County. From Governor Wm. Holden, two specimens silver ore from Elko District, Nevada. From Mr. Glass, calc-spar and asbestos from Calaveras County. From A. J. Severance, two specimens of greenstone (diamond drill core), from Yuba County, and two specimens of silver ore

from Nye County, Nevada. From C. D. Gibbes, four specimens of coal from Australia, Nanaimo and Mt. Diablo.

W. N. Lockington read the following:

Notes on some California Marine Fishes, with Description of a New Species.

BY W. N. LOCKINGTON.

Mr. W. J. Fisher, formerly Librarian of this institution, is now engaged in collecting objects of Natural History on the coast of Lower California. I have up to this period received two consignments from him, consisting of skins of birds and mammals, shells, crustacea, and a few reptiles and radiates.

As the Academy kindly assisted us by furnishing alcohol, and as we wish to do our best to make the collection in this building a complete one as regards Californian species, we shall from time to time, as we are able to identify and describe them, present specimens of such forms as are not in its possession.

The work of identifying is necessarily slow, and our time limited. It is intended for the future to furnish notes with the specimens presented—fishes, crustacea, etc. Our time has hitherto been occupied entirely with the fishes and crustacea.

Among the former are two or three forms which I believe to be new, and several others which are not brought into our markets, although they have been described by Ayres or Girard, and range as far north as San Francisco Bay.

We present this evening specimens of such of these as we have been able to identify or describe, and the greater part of these notes relates to the specimens presented.

Mr. W. G. W. Harford, who has assisted me greatly, has himself taken most of the measurements given in this paper.

Albula conorhynchus. Gunther.

Among the fishes forwarded to us, the only soft-finned ones were two beautiful specimens of about the size of a mackerel, glowing with gold upon the sides, and with darker metallic reflections upon the back, the prevailing tint, however, especially below, being that of burnished silver.

I should have believed them to be fresh water fish had I not known that everything from the waters yet sent by Mr. Fisher was marine. Unfortunately the label attached was so injured by the alcohol that it was lost in unpacking.

The structure of the teeth, however, proved the fish to be no cyprinoid, and the absence of an adipose fin "counted out" the salmon and other families. One of the clupeoid or herring family, therefore, it must be, both by its structure and its marine habitat. Yet it seemed a very singular herring, with its rounded abdomen (the herrings mostly have a sharp abdomen)

and the curious yellow gelatinous membrane, which covered the eyes so as to leave no outward trace of the orbit.

On examining the genera and species of clupeoids given in Dr. Gunther's valuable catalogue, I found, however, one species, the only one of its genus, and this the only one of its tribe, characterized, among other things, by a flat abdomen (which I take to mean not sharp as in the rest of the family), and an "adipose membrane covering the eye." I therefore concluded that my fish was an example of that singular species, and my belief was strengthened by the close agreement of all the other characters, as the number of fin rays, position of mouth, teeth, etc.

The only difference I noted was in the color, which Gunther gives as "uniform silvery," but it must be remembered that these specimens were much fresher than Gunther's could be; and the much greater prevalence of the gold and dark metallic reflections in one of the specimens than in the other, appears to show that the tints are variable. This point I hope to settle ere long, by the aid of Mr. Fisher.

Following are the dimensions of one of the specimens:

	<i>Inches.</i>
Length.....	3.7
Length of head.....	3.5
Length of base of dorsal.....	2.5
Tip of snout to origin of dorsal.....	6.
Length of caudal.....	3.
Tip of snout to base of anal.....	8.
Girth in thickest part, just in advance of dorsal.....	7.

This species has been found in the Atlantic and Indian Oceans, and one of Gunther's specimens was from the Pacific Coast of Central America, but I do not find that it has previously been reported from the North Pacific.

Argyreus Pacificus, n. sp.

Greatest height of dorsal outline, immediately behind the eye; greatest depth of body, immediately in front of anal. Proportion of length to greatest depth, about as 7 to 15. Lower jaw longer than upper. None of the rays of spinous dorsal elongated. First three rays of soft-dorsal very long, next two decreasing, the remainder nearly equal. No free spines in part of anal. First articulated ray of anal much elongated. First three rays of soft-dorsal undivided, the others much branched. Membrane between rays of anal very short, rays much branched, except the first, so that the anal appears to consist of many finlets, especially when depressed. Dentition and branchiostegals, normal. Pectorals very long, one-third the total length of the fish. Fourth, fifth and sixth rays (counting downwards) the longest. Ventrals very short and small. Dorsal outline depressed behind snout, then nearly perpendicular to above posterior edge of orbit, thence almost straight to origin of soft dorsal, thence rounded and rapidly narrowing to peduncle of tail. Caudal lobes very long and narrow. The greatest thickness of the fish is between the eyes and the base of the pectorals. Formula of fins: D, 4 or 5, $\frac{1}{2}$; A, $\frac{1}{9}$; P, $\frac{1}{8}$; V, $\frac{1}{2}$.

Numerous specimens of this species caught in Magdalena Bay have been examined by us, and careful comparison with the forms described in Gunther's catalogue has led me to the conclusion that this is a new species. From *A. vomer* it differs in the extreme shortness of its ventrals, none of the rays of which, or of the spinous dorsal, are continued into filiform prolongations; also, in the greater proportional length of the pectorals. From *A. setapinnis* it can be at once distinguished by the prolongation of the first rays of the soft dorsal and the anal.

The dimensions of a large specimen are as follows:

	Inches.
Extreme length in straight line from the tip of lower jaw to tip of lower lobe of tail.....	15.5
Extreme height in front of anal fin.....	7.2
Height immediately behind eye.....	6.65
Greatest girth.....	14.60
Length along profile from tip of lower jaw to origin of soft dorsal.....	10.60
Length from tip of lower jaw to origin of anal.....	6.75
Length of base of soft dorsal.....	5.60
Length of base of anal.....	5.50
Length of base of pectorals.....	.62
Length of head above orbit.....	3
Length of pectorals.....	5.45
Length of ventrals.....	.5
Length of caudal to division of lobes.....	2.25
Length of lower lobe of caudal from fork.....	3.40
Length of upper lobe of caudal from fork.....	2.95
Length of longest ray of dorsal.....	4.10
Length of longest ray of anal.....	3
Length of lower jaw.....	1.8
Distance from tip of lower jaw to orbit.....	2.65
Diameter of orbit.....	.75
Greatest thickness of fish.....	1

One or two specimens exceeded these dimensions.

Cestracion francisi. Grd. U. S. P. R. R. Rep., vol. x, p. 365.

Of this genus of sharks, so interesting from its occurrence in geological time as far back as the Devonian Age, only four species now exist; one of these, *C. phillipi*, is the often-mentioned Port Jackson shark; another, *C. francisi*, has been caught in the Bay of Monterey, and occurs along the coast at least as far south as Magdalena Bay, Lower California, from which place we received a single fine specimen, the dimensions of which are appended:

	Ft.	In.
Length from tip of snout to tip of caudal.....	2	6½
Length from tip of snout to origin of first dorsal.....		8⅞
Length from origin of first dorsal to origin of second dorsal...		8½
Circumference immediately in front of first gill-opening.....	1	1¼
Circumference immediately in front of pectorals.....	1	1¼

Circumference immediately behind first dorsal.....	11
Circumference immediately in front of second dorsal.....	6 $\frac{1}{4}$
Distance from tip of snout to eye.....	2 $\frac{3}{4}$
Longitudinal diameter of eye.....	$\frac{5}{8}$
Breadth between supra-ocular ridges.....	2 $\frac{1}{4}$
From spiracle to tip of snout.....	3 $\frac{1}{4}$
Length of pectorals along anterior edge.....	7
Height of first dorsal spine.....	2 $\frac{1}{8}$
Length of base of first dorsal.....	2
Length of base of second dorsal.....	2 $\frac{1}{2}$
Length of claspers from opening of anus.....	4 $\frac{1}{4}$
From anus to tip of snout.....	1 1 $\frac{3}{4}$
Width between angles of mouth.....	3 $\frac{1}{4}$

Trachynotus ovatus? Gunther.

Among our fish were several specimens which appeared to agree in every respect with Girard's genus *Doliodon* (*Trachynotus*, Gunther), and to be very near the species named by him *Doliodon carolinensis*. A comparison of proportionate dimensions, however, induces me to consider it as belonging to the long-known species *T. ovatus*, which has previously been found in almost every sea from the east coast of North America to the shores of Australia. The dorsal spines are, one directed forward, six with membrane attached, and one at origin of soft dorsal. The principal measurements of the specimen presented are as follows:

	Inches.
Extreme length.....	11.62
Extreme depth from dorsal to anal.....	5.12
From tip of upper jaw to tip of first dorsal spine, following outline.....	4.0
Thence to origin of soft dorsal.....	1.75
Length of base of soft dorsal.....	3.25
Length of base of anal.....	3.0
Length of base of pectorals.....	0.5
Length of pectorals.....	2.12
Length of ventrals.....	0.95
Greatest girth.....	10.62
Girth at base of pectorals.....	8.5
Length of head.....	2.75
From orbit to tip of upper jaw.....	0.55
Diameter of eye.....	0.60
Greatest thickness of body between eye and pectorals.....	1.25

One of the specimens was at least one-third larger in every dimension.

Paralabrax nebulifer. Grd. P. R. R. R., x, p. 33, pl. xii, fig. 1-4.

This species does not, so far as I know, occur near this vicinity, as I have not yet detected it in the market. We have several specimens from San Bar-

tolome Bay, Lower California, where they were taken among kelp. The largest specimen measures as follows:

	<i>Ft.</i>	<i>In.</i>
Extreme length	1	5½
From snout to posterior edge of operculum		5½
Base of dorsal fin.....		7½
Base of spinous portion of fin.....		3½
Circumference in front of pectorals.....	10½	
From snout to origin of dorsal.....		5½
From snout to origin of anal.....	11	
Length of pectorals.....		3½
From snout to origin of pectorals.....		5 7/10
Length of ventrals.....	3	

Triacis semifasciata. Gnthr. (*Mustelus felis*. Ayres.)

This is one of the commonest sharks of San Francisco and Tomales bays, and is also found on the coast of Lower California. Ayres described it as a *Mustelus*, but its teeth, though somewhat pavement-like, and, in many cases, have points or cusps, whereas in *Mustelus* they are wholly smooth. Both this species and *Mustelus Californicus*, Gill, are commonly called "dog-fish," but, though from their small size, they resemble the real dog-fish or *Scylliador*, they differ from them greatly in their teeth, and in the absence of a nictitating membrane to the eye. A large specimen, procured in this bay, measured as follows:

	<i>Ft.</i>	<i>In.</i>
Tip of snout to end of tail.....	4	3
Tip of snout to origin of first dorsal.....	1	3
Origin of first dorsal to origin of second.....	1	4
Length of base of second dorsal	4.5	
Greatest length of pectorals		8
Length of head on back.....		8
From anterior margin of lower lip to origin of anal.....	1	10
Snout to anterior margin of lower lip.....		3.25
Greatest circumference at origin of anterior dorsal.....	1	6

Mustelus Californicus. Gill.

This is the common "dog-fish" of San Francisco Bay. It does not usually attain the dimensions of the species last named, and is easily distinguished from that prettily marked species by its plain uniform slaty hue, becoming whitish beneath.

Semicossyphus pulcher. Gunther. (*Labrus pulcher*. Ayres.)

This fish was the first of the sixty-eight Californian species described by Dr. W. O. Ayres, and its description forms the first page of the first volume of the proceedings of this Academy. The smaller number of spinous rays in dorsal, the presence of a posterior canine tooth, and the absence of scales on

the pre-operculum, do not allow of its classification in the genus *Labrus*, and Dr. A. Gunther considers those peculiarities sufficiently marked to warrant the formation of a new genus for its reception. Fortunately for us, we have a very full series of specimens; had it not been for this, the extreme forms would certainly be considered distinct species. Not only the coloration, but the form of the head, varies greatly, but the variations will be found, on comparison of a number of specimens, to shade into each other, and the extreme forms are found along with each other among the floating kelp. Some of the specimens were taken at a depth of eight fathoms, but still near kelp. A label attached to a highly colored specimen gives the following particulars of the colors when fresh:

"Iris golden, with a red rim; head to pectorals black, including upper jaw; lower jaw white. Pectorals, ventrals, caudal and dorsal, black. Body from head to a perpendicular from behind anus, deep red, shading into light red under belly. From anus to end of caudal, black."

One of the largest specimens measured as follows:

	Ft.	In.
Total length.....	1	6
Base of dorsal fin.....		7.1
Height of soft dorsal.....		3.5
Length of spinous portion of dorsal.....		5
Length of base of anal.....		3.5
Height of anal.....		2.5
Length of base of ventral.....		1
Length of ventral.....		3
Greatest depth of body, at origin of soft dorsal.....		5.5
Greatest girth at origin of soft dorsal.....	1	1
Length of tail.....		3
End of snout to origin of dorsal, following the outline.....		6.5

Sphyræna argentea. Grd.

Of this rare species one large specimen and three smaller have been sent to us. The largest measured as follows:

	Ft.	In.
Extreme length.....	2	10.5
From tip of lower jaw to posterior edge of operculum.....		9
Base of first dorsal.....		2.6
Tip of lower jaw to origin of first dorsal.....	1	1.2
Base of second dorsal.....		2.6
Tip of lower jaw to origin of second dorsal.....	1	9.5
Length of tail.....		5.2
Girth in front of pectorals.....		8.4
Tip of lower jaw to anterior rim of orbit.....		4
Diameter of orbit.....		1.1

C. W. Kreuger was introduced by Mr. Troyer and delivered a lecture on "Flying Machines," exhibiting and explaining at the same time a model of a flying machine of his own invention.

REGULAR MEETING, AUGUST 20TH, 1876.

Vice-President Hyde in the Chair.

In addition to the usual exchanges there were presented to the Library two volumes of the Annals of the Observatory of Madrid, and two volumes of Hayden's U. S. Geological Survey.

Dr. Kellogg read the following:

Notes and Descriptions of some Californian Plants.

BY DR. A. KELLOGG.

Dr. G. Eisen, of Sweden, placed in our hands for determination his plants collected near Fresno, Cal. A species of *mimulus* appears to be new.

Mimulus Eisenii. K.

Viscid-glandular chiefly above, somewhat pubescent throughout, $\frac{1}{2}$ -1 foot branching from the base, whole plant more or less purplish. Radicle and lower cauline leaves 1-2 inches long, on slender petioles; laminal outline ovate-oblong, oblong, or oblong-subspatulate, pinnatifid, rachis nerved, narrowing into the petiole, which from long becomes equal in the lower cauline, at length very short toward the summit, but all petiolate; lobes variably denticulate, somewhat hispid and ciliate, simply denticulate-pinnatifid in the upper reduced leaves; peduncles subsetiform as long as the flower; calyx colored, pinkish above, yellowish beneath dotted with large purple spots in lines chiefly on the upper side, at length becoming oblique $\frac{1}{4}$ - $\frac{1}{2}$ the peduncle; teeth somewhat triangular-acute, lower a little shorter or subequal in flower, 1-2 lines, carinately incurved, closing the throat toward maturity; upper tooth elongating to apparently twice the length of the lower or nearly half the length of the calyx upwardly curving; corolla yellow, a single lower lobe often white, about five lines or twice the calyx; tube slender, throat expanding, lobes about equal; capsule oblong, obtuse, narrowing at the base into a short stipe.

Also a *Vicia*, which appears to be new.

Vicia nana. K.

A very low (3-6 inches) and slender perennial, erect or ascending, flexuous, sub-four-angled, branching from the base, finely pubescent or nearly glabrous throughout; leaves short, about one inch, tendrils simple or rudimentary; leaflets one to three pairs (or more?), thin nerved, obovate or oval-elliptic, mucronate about half-inch long; stipules narrow lance-acuminate, entire, de-

flexed subulate lobe one-half to one-third shorter; peduncles 2-3 inches long, or about twice the length of the leaves (rarely equal), 3-6 flowered; flowers large, three-quarters to one inch long, calyx ten-nerved, obliquely tubular-campanulate; teeth shorter than the tube, two upper slightly shorter, banner, purple blue; the short wings and keel whitish; staminal sheath very oblique; stigma finely villous, a line or so on both sides; pod glabrous, one inch or more in length, flat linear-oblong, narrowing to a short stipe; 12-14 seeded.

Mr. Samuel Brannan, Jr., placed in the Academy Herb. a new plant collected by him on the top of Granite Mount, Oak Creek, Kern County, April 1st, 1871.

Phacelia Brannani. K.

A low spreading annual, four inches to a span high, much branched from the base, densely minute canescent puberulent throughout, and viscid villous-glandular above; racemes scorpioid, becoming opposite the upper leaves; leaves oblong in outline—2-3 inches long, $\frac{1}{4}$ – $\frac{3}{4}$ inch broad—petiole $\frac{1}{3}$ – $\frac{1}{2}$ the length, bipinnate, lobes subsessile, few pinnatifid above, oblong, crenate and incisely-crenate toothed or subpinnatifid with roundish lobules of variable size and order; corolla open funnel form with a broad campanulate border; lobes rounded, bright blue, genitals included; filaments naked, somewhat in-folded at the base; style shortly bifid, hirsute below; calyx lobes shorter than the tubes, spatulate-linear, about twice the length of the oval hirsute capsule; seeds oblong, compressed, centre depressed, the thickened margin transversely corrugated; about 12-seeded.

Lathyrus splendens. K.

Stem-climbing, perennial, quadrangular, somewhat striate, subpubescent, mostly glabrous, often glaucous; leaflets about eight, scattered, very variable, linear to lanceolate and ovate-lanceolate or oblong on the same specimens, acute, mucronate, strongly three to five-nerved and veined, reticulate, glabrous above, rarely subpubescent beneath, petiolules hirsute; common petioles about equal, subtrigonal, slightly channeled above or margined, puberulent, relatively stout, tendrils two to five-parted; stipules small, semi-sagittate and semi-lunate, upper longer lobe acuminate, subfalcate, entire, or rarely laciniate, notched or toothed, lower mostly repanddentate; peduncles stout, about equal, rarely becoming a little longer than the leaves, seven to ten-flowered, flowers very large, scarlet-purple, pedicels pubescent, two to three times the length of the calyx, articulated; calyx obliquely campanulate, pubescent, eighteen-nerved, upper teeth remote, very short, triangular-acute; the lateral, subblanced nearly twice as long as the upper, and a third less than the lower subulate tooth, which is about equal to the tube; banner about one inch in length and nearly as broad, emarginate, reflexed; keel an inch or more in length by half an inch in depth, acute or subacute; wings narrow, shorter; style clavate, somewhat flattened and folded, or grooved on the outside next to the keel, villous along the inside, one-third to one-half its length; pods three inches in length, glabrous, compressed, symmetrical, 10 to 20 seeded,

color cinnamon brown, inside of the valves silvery satiny; seeds about half the size of common pea, verditer-greenish hue; allied to *L. polymorphus*. A climbing vine, six to ten feet creeping over bushes, and, with its numerous branches and wealth of brilliantly gay scarlet-purple flowers, seen at a distance presents the illusion of a grand flowering shrub, naturally suggesting it as an appropriate accessory for such a purpose in ornamental and rural adornment.

Some specimens have altogether filiform or linear leaves, and filiform subulate entire stipules; some with brighter scarlet flowers, and others purple tints abound; but they are not deemed sufficiently uniform and distinct to entitle them to varieties. Specimens presented by J. M. Hutchings, Esq., from southern California.

Dr. Kellogg exhibited specimens and made some observations on a variety of *Collomia leptalea*, Gray, from Yosemite Valley. The specimens were far more delicate than the original type, in every respect, even like the finest sewing-thread; the most peculiar feature being the disposition to twine, as occasion offers, around contiguous weeds for support. The plants, four to five inches high, have flowers of similar form and relative relations, but sky blue instead of pink; anthers spheroidal; capsule three-seeded—seeds elliptic, somewhat prismatic, subglabrous, or a little rugose, and appendiculate; the whole plant stipulate-glandular, lower leaves opposite (one to two or more pairs) filiform. As we have but two specimens, we reserve a thorough analysis rather than destroy them. Its provisional distinction might well be *filiformis*.

Mr. F. P. McLean, our promising botanical friend—late of the California University, now Johns S. Hopkins University, Baltimore—on the eve of his departure placed in our hands a specimen of *Psoralea*, ticketed "Streams of Tamelpais, 1873," which appears to be new.

Psoralea fruticosa. K.

A low-spreading sub-shrub, more or less canescent-pubescent, with shortish white soft hair throughout; leaves digitately-trifoliate, slender petioles very short (1-2 lines long), appressed; stipules subulate, strongly nerved (3-4 lines long; leaflets cuneate, oblong-obovate, recurve-apiculate, mucronate ($\frac{1}{2}$ to $\frac{3}{4}$ -inch long, 2-3 lines broad); terminal compound spikes sessile, 2-3 inches long; the branches (mostly simple) 1-2 inches long; flowers densely crowded (50-100 or more), very small (2-3 lines), indigo blue, subsessile, or pedicels barely $\frac{1}{2}$ -line; persistent bracts narrowly lanceolate-acuminate about as long as the flowers; calyx teeth ovate-acute, lower tooth about one-third longer, acuminate, banner sub-obcordate cuneate into the claw, wings about equal, keel shorter; legume glabrous, ovate-oblong, acute, wrinkled and roughened. Allied to *P. floribunda* and *obtusiloba*, but readily distinguished by denser branches, foliage and flowers, branching spikes, the full-sized leaves intermixed with the flowers of the base of the spikes, and also crowding them; longer and whiter pubescence, and very much shorter petioles and pedicels, and relatively far longer stipules, and bracts; also, difference of

legume, etc. But not so readily from *P. bracteata* of the Cape of Good Hope. The upper surface of the leaves become of a dark verdigris-green in drying, like *Petalostemon macrostachya* of Torr., but all parts of the flower are most perfectly separate and distinct from the staminal sheath, as in *Psoralea*.

We are indebted to Miss Anderson for the following Lake County Lupin:

Lupinus sericatus. K.

Stem woody at the base, ascending, low ($\frac{1}{2}$ to 1 foot), pubescence white, closely appressed, as if clad in a silvery satiny sheen throughout; leaves 3-5 inches long; leaflets spatulate, extremity broadly rounded obtuse (abrupt mucronation mostly obsolete), base narrowly cuneate, $\frac{1}{6}$ - $\frac{1}{4}$ the length of the petiole (or 1-1 $\frac{1}{4}$ inches); racemes twice the length of the leaves (about six inches long); flowers subverticillate or scattered, purple blue; pedicels rather stout, angled, rarely as long—often shorter—than the calyx; bracts deciduous; calyx campanulate, neither gibbous nor spurred, upper lip shortly two-toothed, the scarcely longer lower lip obsoletely three-toothed; bracteoles subulate, a line or more in length; banner somewhat short, slightly pubescent on the back; wings broad, naked; keel acute, a little ciliate; pods 3-5-seeded; mature legume not seen.

The description of *Psoralea macrostachya* in the recent State Botany should be amended so as to include characteristic coast forms. In this vicinity they are weakly scabrous with elevated glands, as in the description of T. and G.; leaflets rhombic-ovate, pubescent above and subglabrous beneath; peduncles $\frac{1}{2}$ -1 foot or more in length, or 2-6 times exceeding the leaves; pseudo-bracteoles of their base, sometimes developing into accessory leaves; spikes simple, or branched by twos and threes, the floral portion 2-8 inches long, cylindrical and dense, or scattered; bracts relatively broad (2 lines), or half the length of the calyx, rhombic, the abrupt acumination very short, early deciduous; calyx 4-6 lines long; lower tooth $\frac{1}{2}$ to $\frac{1}{3}$ longer, but shorter than the flowers.

Closely allied to *Phacelia ciliata*, Benth., is another form worthy of note, collected by the late Dr. Andrews:

Phacelia glandulosa. K.

Stem annual, a span or more high, with few branches at the top; hispid and stipitate-glandular, mostly throughout; leaves ovate-oblong, somewhat seven-lobed, irregularly sinuate-toothed, three-nerved, canescent-pubescent chiefly above, petioles equal, or of upper leaves shorter; spikes simple, axillary, leafy, terminal one naked, at length elongating into loose racemes, pedicels declined ascending in fruit, genitals much exerted from the blue rotate corolla; calyx lobes linear-spatulate hispid and stipitate-black glandular, and on the inside villous, $\frac{1}{2}$ to $\frac{3}{4}$ the length of the capsule; style deeply 2-parted, shorter than the bearded filaments; capsule ovate-oblong, acuminate, hispid and often glandular on the outer third, about 20-seeded; seeds triangular prismatic, minutely alveolar-pitted.

Among other observations, it is deemed important to place on record that the Hon. Vice-President, H. Edwards, presents to the Academy a naturalized

form of the true European *Bellis perennis*, found by him in Throckmorton's Cañon, growing in moist ground, near the foot of Mt. Tamelpais, in a perfectly wild state, remote from any habitation. It has been duly studied, and carefully analyzed, and is undoubtedly the plant indicated; of course, it only now sports a single series of white rays tinged at the tips with purple; is slightly reduced in size; the floret tubes proper are more hairy; stigmatic appendages not quite so broad, and rather more elongated, when compared with the cultivated plant; the first flowers are on true scapes, later flowers on very short or tufted stems; occasionally a leaf develops on the proper peduncle above the rosulate clustered foliage below.

Nemophila modesta. K.

Slender, weak and prostrate (1-1½ feet); leaves opposite pinnatifid, lobes 3-5, broadly lanceolate entire, sparsely hirsute above and along the veins beneath, subsessile, the narrowing base ciliate; peduncles axillary, hirsute, 3-4 inches long, or 3-5 times the leaves, erect but recurving near the capsule; calyx auriculate and increasing to age, lobes ovate, acute, hirsute; flowers within at the base, twice the length of calyx, naked (no scales, folds or ligules at the base of filaments); stamens 3 long and 2 shorter, base hirsute (anthers dark purple); style 2-parted above, hirsute below, stigmas capitate; capsules hairy, 6-seeded, seeds large and rough.

Found by Kellogg and McLean, near the Guadalupe Quicksilver Mine.

Dr. Eisen also collected specimens of a charming little annual *Lupinus*:

Lupinus citrinus. K.

A low, slender annual, barely a span high, erect and ascending, branched from the base, hairy throughout; lower leaves long slender petioled (relatively shorter above, or from about three inches to less than an inch); leaflets linear-spatulate, attenuate at base, somewhat canaliculate, mucronate, 6-8, ¼-¾-inch long, 1-2 lines wide, stipules adnate, somewhat membranous, lance-subulate, weakly attenuate, 4-6 lines long; main raceme 4-6 inches, those of the branches 3-4, rather closely flowered from near the base (common peduncle naked below about 1 inch); pedicels short and slender; bracts linear-lance-acuminate deciduous; calyx colored, short, upper lip 2-parted, lobes acute, or subacute, lower about equal, minutely 3-toothed, bracteoles minutely obscure or wanting; flowers bright orange or golden, rounded banner dotted with a few oblong pale bluish spots near the infolded centre; wings obtuse, nearly as broad as long; keel naked; creamy-hued pod, oblong-linear, 7-lines long by 1½ wide, torulose, glabrous, 4-seeded, seeds rhomboid, lenticular, black blotched at the germinal end and black spotted along the ridge of the beveled margin, on a leaden ground.

Owing to the very obtuse inflated wings conforming to the general outline and size of the banner, gives the flowers somewhat the appearance of beads of gold. A charming plant for cultivation.

Dr. Eisen also brings to light a new species of *Clarkia*.

Clarkia Eiseneana. K.

Stem glabrous and glaucous, 1-1½ feet high, erect, branching above; leaves ovate-lanceolate or ovate-oblong, acute or subacute, repand-denticulate, sessile, lowest leaves subsessile or very short petioled; petals entire, lamina rhombic on a long slender claw, toothed on one side at the insertion; alternate stamens perfect, a broad densely hairy scale at the base of these filaments in front or on the inside, stigma-lobes equal, the very slender linear capsule sessile, 2-3 times as long as the obpyramidal calyx tube, hirsute together with the calyx.

Camping with Mr. Galen Clarke, he brought in the following:

Potentilla Clarkiana. K.

Stem perennial, tufted or dwarfed, and depressed ¼-1½ inches, bearing a single pair of opposite rudimentary leaves, pubescence scanty, at length glabrous; leaves ternate, leaflets nearly orbicular 4-6 lines, coarsely 5-6-toothed (if simple, 7-toothed), terminal leaflets short petiolulate; bractlets half as long as the calyx lobes, subacute; petals yellow, shorter than the calyx; about one-flowered.

REGULAR MEETING, SEPTEMBER 4TH, 1876.

Dr. A. B. Stout in the Chair.

Twenty-two members present.

Wm. G. Kreuger and Thos. Murffen were proposed for membership.

Donations to the Museum: From Mr. W. P. Truesdell, tarantula and nest. From W. J. Fisher and Henry Edwards, specimens of Crustaceæ. Also, ten fish from Mr. Lockington.

W. N. Lockington read the following:

Remarks on the Crustacea of the West Coast of North America, with a Catalogue of the Species in the Museum of the California Academy of Sciences.

BY W. N. LOCKINGTON.

CANCROIDEA.

Family CANCRIDÆ. Sub-Family CANCRINÆ.

No new species of this sub-family appears to have been found since Stimpson described *Cancer antennarius*.

Cancer magister. Dana. U. S. Ex. Exp., I, 151, pl. VII, fig. 1. Stimpson, Crust. and Ech. Pac. S. N. A., 18; Proc. Cal. Acad. Sci., 1, 88. *Cancer irroratus*. Randall (not Say.) Lockington, Proc. Cal. Acad. Sci., 1876.

The localities given by Stimpson for this abundant species range from Sitka to Monterey, and I have two young specimens among miscellanea, collected at Magdalena Bay, Lower California.

No. 25. San Francisco market, dried, male. W. N. Lockington.

Cancer gracilis. Dana U. S. Ex. Exp., I, 153, pl. VII, f. 2. Stimpson, Proc. Cal. Acad. Sci., I, 88; Crust. and Ech. Pac. S. N. A., 20.

The only specimens I have yet seen are those in the museum of the Cal. Acad. Sci.

No. 26. Two females, dried. Locality unknown.

Cancer productus. Randall. J. A. N. S., Phil., VIII, 116. Dana, U. S. Ex. Exp., I, 156, pl. VII, f. 3. Stimp., Proc. Cal. Acad. Sci., I, 88.

Platycarcinus productus. Gibbs. Proc. Am. Asso., 1050. p. 177. Stimpson, Crust. and Ech. Pac. S. N. A., 21.

This species has been found at Puget Sound, Tomales Bay, S. F. Bay, San Diego, and Magdalena Bay, L. C.

No. 27. Several young specimens from Monterey, dried. Dr. J. G. Cooper.

No. 28. Young, dried. San Diego. Hy. Hemphill.

No. 40. Male, in spirits. S. F. Bay. W. N. Lockington.

Not only are the young of this species very different in appearance from the adult, but they are so variously striped and marked that a superficial examination might cause them to be considered the young of several distinct species. The specimen described by Dana was not fully grown, and, like all the immature specimens I have seen, had the teeth of the produced front low and like lobes, with a short suture on the carapax between each lobe and the next. In the adults, the teeth of the front are more separate and more acute, and the central tooth more produced than the lateral ones; moreover, the nine antero-lateral teeth are distinctly separated from each other, and the body near the antero-lateral margins is thicker than in the young.

The prevailing color of the adult is red, becoming darker and more brownish above, and orange or yellowish below. Among four young ones found under stones at Monterey, two are chocolate, with a somewhat darker tint on the elevated parts of the carapax; a third, bright yellow, with irregular blotches of dark red; and the fourth, yellow, with narrow red stripes, giving it a zebra-like appearance.

An examination of young and adult specimens only would lead to the belief that they were distinct species, but a full series of specimens, of all sizes and ages, reveals their specific identity.

This species is common in the bay of San Francisco, but I have never found either it or its young beneath the stones on the beach, as is the case at Monterey. In April of this year, half an hour's search under the stones at Preston's Point, Tomales Bay, procured me twelve fine adult specimens, all or most of them females. I did not observe any ova attached to them, and I

thought it singular that on a second visit paid to the spot in July, I could not find a single female, though at low tide mark I secured an overgrown male who had lost too many limbs to retreat with sufficient quickness.

Cancer antennarius. Stimpson. Proc. Cal. Acad. Sci., I, 88; Crust. and Ech., Pac. S. N. A., 22.

No. 29. Female, dried. Probably from San Francisco Bay. Wm. Stimpson.(?)

No. 39. Young, between tides. San Diego. Hemphill.

No. 41. Female, with ova. S. F. Bay. W. N. Lockington.

This species appears to frequent deeper water than *C. productus* or *C. magister*, as, though occasionally taken on the lines of the anglers in San Francisco bay, I have never known of its occurrence on the beach between tides. It is found on the ocean shore near Tomales, and occurs as far south as Magdalena Bay, Lower California, where a fine specimen was obtained by Mr. W. J. Fisher.

The sides of the chelipeds are beautifully marbled with dark spots upon a lighter ground in adult recent specimens.

Sub-Family XANTHINÆ.

Until very lately not a single representative of this sub-family had been found upon our western shores, probably because the first collections were made in the neighborhood of San Francisco.

The species named by Stimpson and Dana were collected at various localities from Monterey northward to Sitka, but the coast southward from the former place to Cape St. Lucas, and the shores of the Gulf of California, have been, and still are, comparatively unknown to carcinologists.

All the species of *Xanthina* described or mentioned in these notes have been collected in the last mentioned localities by Mr. Hy. Hemphill and Mr. W. J. Fisher.

Those species which I have previously described from single specimens furnished to the Academy by the former collector are most of them more fully known to me by numerous specimens obtained by the latter during five months spent in dredging and collecting along the uninviting shores of Lower California, while those which are new are in every case the results of the same indefatigable collector's labors.

It is somewhat singular that, so far as I am aware, not a single species of this sub-family has yet been found along the shores of Northern California, Oregon, or Washington Territory, and I cannot avoid thinking that further search may disclose some.

The genus *Panopæus* is represented on the shores of Central America by two or three forms which have not hitherto been found so far north as Lower California.

I own myself unable to perceive any sufficient reason for the separation of *Xantho* from *Xanthodes*, but I have relegated two of the narrowest forms to the latter group.

Atergatis cristatissimo. Lockington. Proc. Cal. Acad. Sci., March 20, 1876.

La Paz, San José Island, Amortiguado Bay.

This pretty little species does not appear to occur on the west coast of Lower California.

The color of the carapax in spirits is the same as in the dried specimen, viz., bright red.

No. 30. Two males, dried. From La Paz. D. E. Hungerford.

No. 42. Male and female, in spirits. W. N. Lockington.

Actæa meandricus. nov. sp.

Front four-lobed, antero-lateral margin without conspicuous teeth; postero-lateral margin highly concave.

Entire upper surface of the carapax covered with involved rugæ; those of each areolet distinct; areolets separated by sulci.

Chelipeds equal, their upper outer surface rugose like the carapax, the rugæ giving way to rows of tubercles on the underside of the manus.

Upper edge of the manus and carpus an acute angle; inner surface of both perfectly smooth; meros smooth on both sides, compressed.

Hinder limbs with compressed joints; the meros smooth on both sides, except in the fifth pair; the remaining joints rugose on their upper and posterior aspects. Meros of fifth pair rugose above. Fingers of chelipeds sulcate, short. Sternum cavernous; abdomen with transverse rugæ. Color, in spirits, dull red.

Locality, Mulege Bay, Gulf of California.

Two specimens, a male and female, are all I have seen of this well marked species.

	♂ M. M.	♀ M. M.
Greatest length.....	20	19
Extreme width of carapax.....	27	25

This little crab has a peculiarly compact appearance. The rugosities of its limbs are so arranged that when they are folded up close to the carapax not a portion of smooth surface can be seen either above or below, the only smooth portions being lateral and hidden.

Heteractæa. nov. genus.

Form of carapax as in *Actæa*, but with an external hiatus to the orbit, and its lower margin divided into two lobes. Abdomen of male, five-jointed.

I am loth to form a new genus for a species which resembles an *Actæa* so closely in its general aspect and form, which, in my belief, afford far better evidence of the real affinities of any animal than are afforded by variations in the form of the orbit or the length of the basal joint of an antenna; but I have no choice in the matter, as the genus *Actæa* is defined as "without an external hiatus to the orbit," while the genera with the lower margin of the orbit divided into teeth have a seven-jointed abdomen in the male.

Heteractæa pilosus. nov. sp.

Aspect that of an *Actæa*, but the orbit with an external hiatus, and its lower margin divided into two separate lobes. Front two-lobed, upper mar-

gin of orbit a long thick, sinuate tubercle. Teeth of front, upper and under margins of orbit, and a small tooth just external to the outer hiatus of the orbit, red, smooth, shining, and naked. The remainder of the upper surface of the carapax thickly tomentose. Antero-lateral margin with three sharp teeth projecting beyond the tomentosity. Regions of carapax distinct. Chelipeds tomentose, the carpus and manus covered with tubercles arranged in regular series on the outer side of the manus. Right cheliped larger than left; fingers sulcate. Tubercles of manus and carpus red, the red predominating at the distal end of the manus. Longer hairs scattered at intervals among the tomentosity of the carapax; hinder limbs thickly pilose.

Localities, San José Island, Amortiguado Bay; and Port Escondido, both in the Gulf of California.

Several specimens. The largest pair measure as follows:

	♂ M. M.	♀ M. M.
Greatest length.....	19	15
Greatest width.....	27	20

No. 43. Male and female, in spirits. Fisher and Lockington.

Xantho tenuidactylus, nov. sp.

Front declivous, antero-lateral margin without distinct lobes or teeth, thick; anterior portion of carapax somewhat negose, granulate; carpus and manus thickly covered with large granulations above and externally, the granulations extending on to the upper and outer surface of the fingers; fingers sulcate, those of the right cheliped (which is the larger) rather short; those of the left cheliped exceedingly long and thin. Hinder legs somewhat tomentose.

Color reddish-brown; fingers black.

One specimen only, a female, taken at low tide, on the flats at La Paz, Lower California.

	M. M.
Length of carapax.....	15
Width of carapax.....	11

Xantho grandimanus, nov. sp.

Carapax transverse, antero-lateral angles not prominent. Front four-lobed, the central emargination running back as a deep sulcus across the frontal regions of the carapax. Upper margin of orbit tumid, backed by a deep sulcus, giving off at a right angle, a sulcus separating the median from the lateral regions of the carapax. Antero-lateral teeth, five; the first two long and low; third low, but somewhat shorter; fourth much shorter and pointed; fifth very small. Areolation indistinct; frontal and antero-lateral regions granulated. Right cheliped very large, smooth, meros hollowed out throughout its posterior upper surface so as to fit closely to the under surface of the carapax; carpus large, heavy and rounded; manus broad, rounded above and without crests or tubercles; movable finger with a very large tubercle at its inner base; fixed finger with three or four tubercles. Left cheliped similar, but much smaller; fingers much smaller proportionately to the manus than

in the larger cheliped; fingers with numerous tubercles on inner surface. Hinder limbs rounded; the two last joints tomentose.

Color reddish-brown; fingers slaty.

Locality, La Paz, L. C.

The dimensions of a large specimen of each sex are as follows:

	♂ M. M.	♀ M. M.
Greatest width of carapax.....	71	60
Greatest length of carapax.....	50	41
Length of larger hand.....	65	50
Length of smaller hand.....	47	39
Greatest width of larger hand.....	27	22

No. 31. Male and female and young. Identity of donor unknown.

Xantho multidentatus. Lockington. Proc. Cal. Acad. Sci., Feb. 7, 1876.

No. 38. Male, dried. Mazatlan. Hy. Edwards.

PARAXANTHUS.

Xantho novem-dentatus. Lockington. Proc. Cal. Acad. Sci., Feb. 7, 1876.

San Diego; San José Island, Amortiguado Bay.

Four or five specimens only. Color of carapax in spirits, whitish, with a tinge of red, and with red markings. The front is much more produced than usual in this species.

No. 32. Male, dried. San Diego. Hy. Hemphill.

All but one of the specimens from Lower California are smaller than the type specimen which was procured at San Diego, and the carapax is proportionally narrower, yet I believe them to be younger individuals of the same species, founding my belief on the prominent, narrow, entire part, curved outline of the antero-lateral margin, without perceptible angle at its junction with the postero-lateral; and on the character of the left cheliped, the fingers of which are sulcate, and devoid of prominent tubercles on their palmar surface.

Xantho spini-tuberculatus. Lockington. Santa Rosa Island, Monterey, San Diego, Magdalena Bay, San José Island.

This species appears to be of common occurrence along the coast from Monterey southward to Magdalena, but to disappear, or at least become rare, in localities further south.

Dimensions of the largest specimen:

	M. M.
Greatest length of carapax.....	30
Greatest width of carapax.....	40

The right hand in this large specimen (a male) is very much larger than the left, but this is not universally the case.

Color, in spirits: carapax greenish, with maroon cloudings; tubercles of first pair and front of carapax bright red; hinder limbs crossed by maroon bands; fingers black.

No. 33. Monterey. Dried. J. G. Cooper.

Xantho Hemphilliana. Lockington, Proc. Cal. Acad. Sci., Feb. 7th, 1876.

The only specimen I have seen of this species is the one in the possession of the Academy of Sciences, San Francisco. Some small crabs from the Gulf of California, which I at first believed to be young specimens of this form, differ in their less transverse form and more perfect areolation, and I now think them distinct, yet this can only be proved by the examination of a complete series of the Monterey form.

No. 35. Large male, dried. Monterey. Hy. Hemphill.

Xanthodes leucomanus. Lockington, Proc. Cal. Acad. Sci., Feb. 7th, 1876.

Carapax rather narrow; areolation very distinct, cardiac region circumscribed; three antero-lateral teeth (the three posterior ones) usually distinct, and directed laterally, the space usually occupied by the first two antero-lateral teeth forming an almost straight line. Basal joint of outer antennæ reaching the front; lower margin of orbit two-lobed; inner hiatus wide; front sinuate, a process meeting the basal joint of the external antennæ. Internal antennæ stout. Chelipeds sub-equal, manus broadly ovate, stouter than the carpus, smooth, shining, with a slightly raised upper edge; dactylus and pollex alike, short and stout, conical, toothed inside; furrowed. Carpus often with a roughened upper surface. Ambulatory feet almost free from setæ, but the dactyli thickly covered with very short tomentosity.

	♂ M. M.	♀ M. M.
Length of carapax.....	9	8
Width of carapax.....	11	9.5

Numerous specimens of this species were brought from La Paz, Port Escondido and Mulege Bay, Gulf of California, by W. J. Fisher. They show great variation in color, areolation, and other characters. In some the posterior portion of the carapax is much less distinctly areolated than in others; many individuals have the upper surface of the carpus, and even that of the manus, more or less rugose; some have black fingers with white tips, others have colored fingers, and the general tint of the carapax varies considerably. The original specimens from which my previous short description of this species was written, were lost in removing our collection, and I cannot, therefore, feel certain of the identity of the Gulf form with the one first described.

Xanthodes? angustus. nov. sp.

Carapax narrow, front wide, slightly sinuate; antero-lateral margin shorter than postero-lateral, three-toothed; teeth pointed forwards; the posterior margin of the hindermost teeth in a line with the postero-lateral margin. Upper margin of the orbit two-lobed, excluding the post-orbital, which is lower than the two succeeding antero-lateral teeth. Upper surface of the carapax smooth, shining, without areolation, except in the frontal region, and near the antero-lateral teeth. Chelipeds smooth, shining, without areolation, hairs or tubercles, hands rather broad, equal in size, fingers of right hand tuberculate

on the palmar surface, those of left hand with a cutting outer edge. Hinder pairs of limbs slender, slightly pilose. Color reddish brown (in spirits); chelipeds bright red.

Localities—Magdalena Bay, west coast Lower California; Mulege Bay, Port Escondido, San José Island, Gulf of California.

	M. M.
Width of carapax.....	14
Greatest length.....	10

These dimensions are from one of the largest specimens.

The extreme narrowness of the carapax and shortness of the antero-lateral margin make me doubtful of the propriety of placing this species in the subgenus *Xanthodes*. Its aspect is much that of a *Pilodius*, but the fingers are not spoon-shaped. There are a few scattered setæ on the two last joints of the ambulatory feet. There is considerable resemblance between this species and *X. latimanus* from San Diego, but the hands of the former are wider and the antero-lateral teeth more robust. The difference in size between the present form and the single male of *X. latimanus* in the Mus. Cal. Acad. Sci. is great, but it is not unlikely that it is either the young or a small variety of that species, but as the gulf species are in most cases distinct from those of the west coast of Lower California, I do not venture to unite them.

Xantho latimanus. Lockington, Proc. Cal. Acad. Sci., Feb. 7, 1876.

No. 34. Male, dried. San Diego. Hy. Hemphill.

Panopæus purpureus. nov. sp.

Carapax convex both longitudinally and transversely, branchial regions tumid, sulcus between gastric and cardiac regions distinct. Surface finely granulated, the granulations with a tendency to form beaded ridges. Intra-medial and extra-medial regions distinct from each other and from the antero-lateral. First two teeth of antero-lateral margin coalesced, forming a prominent bi-lobed tooth; third and fourth teeth curved forwards, the fourth shortest; fifth thick and rounded, directed forwards. Sub-hepatic spine prominent. Inferior margin of orbit three-lobed; interior lobe inconspicuous; middle lobe narrow, thick, projecting; outer lobe long, low, thin, highest on its outer angle. Outer hiatus of orbit deep and narrow. Superior margin of orbit with slight indications of a division into three lobes. Chelipeds smooth, unarmed, the right the larger; propodi and dactyli of hinder limbs beset with short bristly hairs. Color of carapax and upper surface of chelipeds bluish purple, becoming darker in the older specimens. Irregular spots and blotches of a dark brownish purple are conspicuous in the younger specimens, but become indistinct in the older, except upon the chelipeds. Fingers brown, with white tips.

	♂ Inches.	♀ Inches.
Greatest length of largest specimens.....	1.30	.95
Greatest width of largest specimens.....	1.75	1.30

Localities.—Magdalena Bay, west coast Lower California; La Paz, Gulf of California. Apparently rare, as Mr. Fisher obtained but few specimens.

No. 44. Male and female. Magdalena Bay. W. J. Fisher.

Panopæus transversus? Stimpson, Am. Lyc. Nat. Hist., N. Y., vol. VII, p. 210.

Numerous specimens of a small species of *Panopæus* from Lower California do not agree at all with any of the species described by S. I. Smith, in the Proc. Boston Soc. Nat. Hist., vol. XII, Feb. 3, 1869, and from their transverse shape and the small size of the sub-hepatic spine, may probably be the *P. transversus* of Stimpson. As, however, I have no access to Stimpson's description, I think it well to subjoin a short description, as it may possibly prove to be a distinct species. Front slightly sinuate, antero-lateral teeth four, the two first long and low, the last two more pointed, with the points turned forwards. Right cheliped slightly the larger, both chelipeds smooth, shining, whitish, except on the upper surface, where the tint deepens to a reddish brown, which is the general color of the carapax. Hinder pairs of legs tomentose. Two of the largest specimens measured as follows:

Length of carapax.....	♂ 0.65	♀ 0.56
Width of carapax.....	0.92	0.80

Numerous specimens were obtained in San Bartolomé and Magdalena bays, and Santa Maria Bay, all on the west coast of Lower California; also, at La Paz, Gulf of California, where it was dredged at (so far as I can make out the label, which was unfortunately torn) a depth of three fathoms. The veritable *P. transversus* was found at Corinto, Nicaragua, by J. A. McNeil (*vide* S. I. Smith, *loc. cit.*).

No. 45. Several specimens, in spirits, from Magdalena Bay. Fisher and Lockington.

Panopæus validus. S. I. Smith, Proc. Boston Soc. Nat. Hist., 1869, 273.

Panama and Acajutla. External opening of orbit broad and deep.

Panopæus Bradleyi. S. I. Smith, *loc. cit.*, 281.

Panama. External opening of orbit a deep notch rather than a groove.

Panopæus planus. S. I. Smith, *loc. cit.*, 283.

Panama. Sub-hepatic tubercle not prominent. Antero-lateral margin with four slight incisions, as in *P. transversus*.

Acanthus spino-hirsutus. Lockington, Proc. Cal. Acad. Sci., Feb. 7, 1876.

The range of this species is much more extensive than that of most of those described in the paper above referred to. The first specimen obtained was brought, with specimens of several other species, from San Diego; but whereas most San Diego forms extend down the western coast of Lower Cali-

fornia, but do not appear—judging from present knowledge—to inhabit the Gulf of California, the present species has been found in abundance at La Paz, Mulege Bay, Port Escondido and San José Island, all within the Gulf. One peculiarity of this form is the bright red tint of the prominent transverse ridge in front of the buccal area. None of the specimens I have seen from Lower California exceed in size that brought from San Diego.

No. 36. Male, dried. San Diego. Hy. Hemphill.

Menippe obtusa. Stimpson, Notes on N. Amer. Crust. (Annals Lyc. Nat. Hist., N. Y., 1858), p. 7.

Panama.

CHLORODINÆ.

No species of this group is mentioned by Stimpson, either in Crust. and Echi. Pac. Shore N. Amer., or "Notes of North American Crustacea." I have here described three species, all of which were brought from Lower California by Mr. W. J. Fisher. Although distinguished as a sub-family on account of the more or less perfect spoon-shaped tips of the dactylus and pollex of the chelipeds, the *Chlorodinæ* are so closely related to the *Xanthinæ* that it would be more natural to intercalate their genera among those of that sub-family; for instance, *Chlorodius* next to *Xantho*, and *Actæodes* next to *Actæa*.

Actæodes mexicanus. Lockington, Proc. Cal. Acad. Sci., March 20, 1876.

Mazatlan, Magdalena Bay, La Paz, where a few were dredged in thirteen fathoms; Port Escondido, Gulf of California; San José Island, Amortiguado Bay, Mulege Bay. The carapax of the largest specimen obtained measures 33 millimetres in width, and 21 in length. The color ranges from dark reddish brown, sometimes tinged with green to almost white, and in some cases even the fingers are whitish. Females with ova were collected from July to August. This species is found at low tide, under stones and in coral.

No. 37. Male, dried. Mazatlan. H. Edwards.

No. 46. Male and female, in spirits. Magdalena Bay. W. J. Fisher.

Actæodes xantho. nov. sp.

Carapax broadly transverse, without teeth on antero-lateral margins or front, which slightly curve outwards in front of each areolet. Areolation complete, middle region with nine areolets. The hinder posterior areolet (2P. Dana) entire, long and narrow, four smaller areolets between this and the median region, and ten areolets on the antero and postero-lateral regions of each side. Chelipeds short, the meros hidden beneath the carapax, manus and carpus about equal in length, their upper surface covered with tubercles about as large as those of the carapax. All the raised portions of the carapax, and tubercles of areolets covered with granules, the sulci between tomentose. Dactyli of first pair very short, obtuse at end, the tips somewhat hollowed out, but the hollows not circumscribed within. Hinder feet short, compressed, their upper surface with elongated tubercles less distinctly granulated than

those of the carapax and chelipeds, the sulci and terminal joints tomentose. Abdomen tomentose.

	M. M.
Length of carapax.....	11.5
Width of carapax.....	18

A single specimen, female, from San José Island, Amortiguado Bay, Gulf of California. In spirits, the areolets are of a bright yellow color. There are five tubercles on the carpus, and as many on the hand. The genera *Actæa* and *Actæodes* are usually placed in separate sub-families, but the artificiality of this separation is evident to any one who compares the species belonging to the two genera. In this species, as in *A. speciosa* and *A. cavipes*, Dana, and *A. mexicanus* (*mihi*), the tips of the fingers are but imperfectly excavate, and the forms belong as truly to *Actæa* as to *Actæodes*. The two genera form, in fact, a continuous series of closely allied species.

Chlorodius Fisheri. nov. sp.

Similar in proportions to *C. sanguineus*, Edwds, but the carapax is widest between the posterior teeth of the antero-lateral margin. Front 4-lobed; a deep emargination between the long central lobes. Teeth of antero-lateral margin five in number, acute, sub-equal, and directed forwards. Areolation less distinct than in *C. sanguineus*; areolets well-defined anteriorly, but not posteriorly. Pre-medial areolets joined to the extra-medial; intra-medial separated from the posterior or cardiac by a distinct sulcus; areolets of antero-lateral region six in number; postero-lateral and posterior regions without distinct areolation. Chelipeds equal, smooth, except a tooth on inner angle of carpus; all the fingers spoon-shaped, but the cavity not circumscribed within. The fingers are sulcated. Posterior legs slightly setose, claws sharp.

Color. Carapax, greenish red; chelipeds, marbled with purplish red, white beneath; fingers, black. Length of carapax of largest specimen (male), 0.78 in.; greatest width, 1.06 in.

Numerous specimens from the West coast of Lower California, collected by W. J. Fisher, also from La Paz, San José Island, Mulege Bay and Port Escondido, all in the gulf of California. It is found on the flats at low tide.

No. 47. In spirits, Magdalena Bay. W. J. Fisher.

Family ERIPHIDÆ.

27. *Ozius verreauxii*. De Saussure. Revue et Magasin de Zoologie, V, 359, pl. XII, f. 1.
Mazatlan.
28. *Xanthodius sternberghii*. Stimpson. Notes on North American Crust. 6.
Panama.
29. *Pilumnus limosus*. S. I. Smith. Proc. Bost. Soc. Nat. Hist, XII, 286, 1869.
Panama. Peru.

30. *Eriphia squamata*. Stimpson. Notes on North American Crustacea, p. 10. (Annals Lyceum Nat. Hist., N. Y.)

Panama. Corinto, Nicaragua.

31. *Trapezia formosa*. S. I. Smith. Proc. Bost. Soc. Nat. Hist., Feb. 3 1869.

Pearl Islands, Bay of Panama, among *Pocillopora capitata*, Verrill.

32. *Trapezia cymodoce?* Guerin. Dana. U. S. Ex. Exp., p. 257, pl. XV, Fig. 5. S. I. Smith, *loc. cit.*

Locality the same as the preceding species.

33. *Quadrella nitida*. S. I. Smith. *loc. cit.*

Locality, Pacheca, one of the Pearl Islands, 6 to 8 fathoms, among pearl oysters.

When Stimpson, in 1857, published his "Crustacea and Echinodermata of the Pacific Shores of North America," not a single species of the large family *Portunidae* had been discovered. The same naturalist in his "Notes on North American Crustacea," published in 1859, mentions one species, *Lupa bellicosa*, Sloat, MS., but gives no description, remarking that it "agrees with *L. hasitata* in almost every character, except that the last two joints of the abdomen in the male are broader and more flattened."

In February of this year I described a second species, a specimen of which had been procured the preceding year at Mazatlan by Mr. Henry Edwards; and I shall in this paper describe a third, of which many individuals have been collected by Mr. W. J. Fisher at various points on the Western and Eastern shores of Lower California. At Magdalena Bay Mr. Fisher procured several very specimens of a *Lupa*, which I take to be the *L. bellicosa* of Sloat and Stimpson, but as Sloat's MS. is not on hand, and Stimpson gives no figure, my sole reason for this belief is that the other two known species from Lower California, belong to the genus *Amphitrite*, as defined by Dana.

That there may be no confusion I append a description of this *Lupa*.

Lupa bellicosa? Sloat, MS. Stimpson. Notes on N. Amer. Crust., p. 11.

Carapax regularly arched in its longitudinal and transverse directions; exceedingly wide, the post and antero-lateral outlines forming a long ellipse; no areolation except a sulcus between the median and posterior regions. Central tooth of front placed low down, between the internal antennæ, and separated by a short, somewhat pilose, space from the front proper, which has two lateral spines separated by a sinuous central portion. Upper margin of the orbit consisting of two long teeth, an ante and post-orbital; the former highest above the outer antennæ, and separated by a deep notch from the latter, which is two-lobed, the anterior lobe low, and the posterior long and pointed. Antero-lateral teeth nine, including the posterior lobe of the post-orbital, which exceeds in height any of the others except the ninth. 2d, 3d,

4th, 5th, 6th, 7th and 8th antero-lateral teeth equal, all broadly triangular. Ninth tooth much the largest, its upper ridged edge continuing across the carapax for some distance. Lower margin of the orbit pilose, rising into a conspicuous tooth immediately below the outer antennæ. Underside of carapax and sternum without hairs, except below the hinder part of the antero-lateral regions. Meros of first pair trigonal, with four sharp spines on its upper anterior edge and two blunt teeth at the distal extremity of its posterior edge. Carpus with two or three ridges exteriorly, and some short, blunt spines anteriorly. Manus with a triangular tooth next the carpus on its upper anterior edge, and also a blunt tooth at the distal extremity of its upper posterior margin. Dactyli only slightly sulcate; the teeth of the inner margins in groups of three; the central one largest. Second, third, and fourth pairs of limbs stout; the two last joints compressed and sulcate, pilose posteriorly. Fifth pair stout, without sulcations on the last two compressed joints.

Several fine specimens of this species were brought from Magdalena Bay, by Mr. W. J. Fisher.

The dimensions of a large individual, of each sex, are as follows:

	♂ M. M.	♀ M. M.
Length of carapax.....	6.	5.3
Greatest width of carapax.....	11.5	10.2
Length of right manus.....	7.	5.

The color is almost brown above, cream-colored below, the tubercles and ridges of the manus tinged with red.

No. 22. Male, in spirits; fine specimen. Fisher and Lockington.

Lupa dicantha. M. Edwards. Hist. Nat. des. Crust., tom. 1, p. 451. Dana. U. S. Ex. Exp., 1, 272, pl. XVI, fig. 7, T. Hale Streets. Proc. Acad. Nat. Sci., Phil., 1871, p. 239.

Amphitrite Edwardsii. Lockington. Proc. Cal. Acad., March 20, 1876.

On looking over a number of Amphitrites from Lower California, I found one only, a large female, that can be referred to this species.

It presents all the characters of the type in the Academy's museum, but in a more marked degree from its larger size. The nine spines of the antero-lateral margin are alternately large and small, the ninth no larger than the first, third, fifth, and seventh; and the points of all are black. The meros of the first pair of legs has five black-tipped spines, that nearest the carpus smaller than the central three and equal to the proximal one. The inter-orbital teeth are eight in number, and the ridges across the carapax well defined. The spines of carpus and manus agree exactly with those of the smaller specimen, previously described, and all are tipped with black.

The general color of the carapax and limbs, in spirits, is red, with lighter marblings. The tips of the fingers are black.

	M. M.
Extreme width of carapax.....	51
Extreme length.....	32
Length of movable finger.....	13

The upper part of the carapax is thickly tomentose, except upon the ridges. This species is well marked, and readily distinguished from the following.

No. 23. Female, dried. Mazatlan. Hy. Edwards.

Amphitrite paucispinis. Lockington.

Inter-antennal front four-lobed; pre-orbital spines slightly two-lobed. Antero-lateral spines were nearly equal in size, except the ninth, which is twice the length of the others. The outline of front portion of carapax between the last antero-lateral spines, on each side, is a regular ellipse. Posterior to the last antero-lateral spine the carapax contracts suddenly in width, so that the postero-lateral margins are L-shaped. Meros of first pair with four spines on its anterior margin, the proximal smallest. Carpus with one spine on the interior upper margin, and two on the exterior. Manus with one spine only, on its upper margin, forming the extremity of a carina. Four slightly beaded ridges on the outer side of the manus. Fingers sulcate, tubercular on the palmar margin, the movable finger with a large tubercle at the base. Second, third, and fourth pairs of limbs slender; penultimate joint of fifth pair sulcate and surrounded, as is also the last joint, with a regular fringe of hairs. Areolation of carapax very distinct; the summits of each region granulated.

The dimensions of two of the largest specimens, both female, are as follows:

	M. M.	M. M.
Extreme width from tip to tip of spines	40	54
Greatest length.....	23	30

Localities—Angeles Bay, Mulege Bay, both in the Gulf of California; Magdalena Bay, West Coast Lower California.

The specimens were collected at low tide in August and September, and many of the females have the ova attached.

No. 24. Two males, dried. Magdalena Bay, West Coast Lower California. Fisher and Lockington.

Araneus bidens. S. I. Smith. Report Peabody Acad. Sci., 1869, p. 90.

Callinectes sp? "Agrees with Ordway's *C. arcuatus*. Bost. Jour. Nat. Hist. VII, p. 578, except that there is only one distinct spine on the carpus of the chelipeds." S. I. Smith. *loc. cit.*

In my last paper upon this subject, two species of Maloid crabs mentioned in a "Catalogue of Crustacea from the Isthmus of Panama," by T. Hale Streets, was included, viz.: *Homalacantha hirsuta* (T. Hale Streets), and *Mithraculus coronatus* (Stimpson). Mr. Streets does not state on which side of the Isthmus the various species enumerated in his catalogue were collected; therefore, although I am aware that in some cases the same species occurs on both sides, I shall not in future include in this catalogue any but undoubtedly Pacific species.

Mr. Streets describes the following new species, giving Isthmus of Panama as their locality:

Mithraculus coronatus.
Aniculus longilarsus.
Cenobita intermedia.
Gebia longipollex.
Alpheus hispidus.

The following species included in his list are Atlantic forms, some of which may possibly occur in the Pacific, also:

Mithraculus coronatus, St. Gulf of Mexico, Brazil.
Carpilius corallinus, M. Edwards Antilles.
Actæa labyrinthica, St.?
Menippe mercenaria, St. Atlantic.
Lupa rubra, M. Edwards Brazil.
Ocypoda rhombea, M. Edwards Antilles, Brazil.
Uca lævis, M. Edwards Antilles, Brazil.
Hippa emerita, M. Edwards Antilles, Brazil.
Cenobita diogenes, M. Edwards Antilles.
Panulirus guttatus, Latn. M. Edwards Antilles.
 " *americanus*, Lamk. M. Edwards Antilles.

The following probably reach as far north as Panama, and are therefore referred to in their order:

1. *Panopæus chilensis*.
4. *Ocypoda Gaudichaudii*.
2. *Lupa dicantha*.
3. *Eriphia gonagra*.

W. N. Lockington read the following:

Notes on Californian Fishes.

BY W. N. LOCKINGTON.

Raia batis. Linn.

Uraptera binoculata. Girard.

Dr. A. Gunther, in the Cat. Fishes Brit. Mus., Vol. VIII, p. 465, states his belief that the latter of these fishes may be regarded as a climatic variety of *R. batis*. He goes on to say that "young examples have a round obscure spot on each pectoral fin."

Had Dr. Gunther seen the fish alive, or in a fresh condition, I think that his opinion would have been different, but, as the Catalogue shows his only specimens were young, one from San Francisco, presented by Dr. W. O. Ayres, the other a skin only, presented by J. Keast Lord, from Vancouver Island.

I have myself seen specimens of large size in which the spot is as distinct as in the young, and though I cannot say I have measured them, I feel assured that one I saw in the aquarium at Woodward's Gardens about a year ago was two feet across the fins; and that the one now there is about eighteen inches.

Moreover, the eye-like spot in the centre of the pectoral is anything but obscure in the recent fish, it is most conspicuous.

But this is not all. We have in our possession a fish (caught in San Francisco Bay,) which agrees in every respect with the description of *R. batis* in the Brit. Mus. Cat.

I subjoin the dimensions—

	INCHES.
Width across pectorals.....	18.38
Tip of snout to centre of posterior jaw.....	4.12
“ “ anterior edge of anus.....	12.75
“ “ “ orbit.....	4.12
Tail to back of ventrals.....	8.75
Inter-orbital space (width of).....	1.37
Width across ventrals.....	7.50

Body and fins of a uniform slaty brown color. The difference in aspect between this fish and the *Uraptera* or *Raia binoculata* is very great.

Centropomus. Sp.?

Body oblong, compressed; head contained four and a half times in the total length; outline of top of head nearly straight, slightly concave, ridges of upper surface prominent; depth increasing to origin of first dorsal, thence nearly equal to root of second dorsal, thence decreasing gently to peduncle of tail. First dorsal with eight spines—the first minute; the second about one-sixth the length of the third; third, longest, very stout; fourth, fifth, sixth and seventh rapidly decreasing; eighth, prostrate. Pectorals small, extending to little more than the half length of the ventrals, which exceed them in size. First spine of anal very small; second, long and stout; third, slender, but slightly the longest. The orbit is slightly elliptical. Lower jaw protruding beyond the upper; maxillary, when the mouth is closed, extending to a perpendicular from the centre of the pupil. Teeth nominal. Pre-operculum strongly serrated. Color, when fresh, back to lateral line dark green, becoming lighter below, and whitish on the belly. Snout, green, yellow on the sides. Iris, golden. Pectorals, lead-color, with green centre; ventrals, the same. Caudal, lead-color in centre, with green margins. Dorsal, green, with bluish stripe, and tipped with golden. Fin-formula, D. $8\frac{1}{10}$; A. $\frac{3}{6}$. Branchiostegals, 7. The following are the principal dimensions of the specimen presented:

	Ft.	In.
Total length, from tip of lower jaw to end of tail.....	1	5.5
Length of head, from tip of upper jaw.....		3.88
Tip of snout to origin of first dorsal.....		5.5

Origin of first dorsal to origin of second dorsal.....	3.35
Length of third dorsal spine.....	2.25
Length of base of first dorsal.....	2.75
Length of base of first anal.....	1.5
Eye to tip of snout.....	1.3
Circumference at origin of spinous dorsal.....	7.5
Width of inter-orbital space.....	0.63

The single specimen was taken by Mr. W. J. Fisher, off Asuncion Island, Lower California, at a depth of eight fathoms.

The proportions and coloration of this fish agree very nearly with those of *Centropomus undecimalis*, Cuv. and Val.; and I strongly suspect its identity with that species, which is, however, not known to me from specimens or figures.

C. undecimalis is a native of the Atlantic shores of tropical America; but Dr. Gunther queries its occurrence at Lima. If it should prove, on further acquaintance, to be a distinct species, I propose to name it *Centropomus viridis*.

Dr. Kellogg submitted the following:

On some New Species of Californian Plants.

BY DR. A. KELLOGG.

Dr. G. Eisen's specimens of *Carpenteria Californica* in full flower enable us to record some further items of interest. In these the flowers are pure white, fragrant, 2-2½ in expansion; bracteoles ovate, acute, instead of "subulate," only ¼ inch below the flower, and as the central peduncle has none, under high culture, it is fair to presume these would prove only reduced normal leafy bracts; the petioles are connate at base, often shortly sheathing. The flattened cymosely-panniced masses of flowers show it to be a more compact bloomer than our *Philadelphus* species, which it so much resembles; the intermixture of buds with the open flowers also indicate a lengthened period of bloom. This must prove a most valuable ornamental acquisition.

In Dr. Eisen's collection we also find a new species of Blazing Star, or *Mentzelia crocea*. K.

Annual (?) stem branching two feet or more high, bark white, ashy puberulent and scabrous, hirsute with rather long white simple hairs above, leaves oblong, pinnatifid, lobed, upper ovate-lanceolate, acuminate, sessile, sinuate-pinnatifid or toothed; flowers axillary and terminal; subtending bracts ovate-acuminate, coarsely toothed or sub-lobed. (1-2 on each side.)

Capsule, slender, clavate or gradually enlarging above to the truncate top; sessile, hirsute, an inch or more long; immature seeds, flat. Calyx segments ovate-lance-acuminate—half the length of the stamens, or about ⅓-½ the petals; hairs on the back from conspicuous elevated gland-like bases; petals, five, oval or oval-oblong, abruptly short-acuminate, golden satiny yellow, on a very short saffron-colored claw; flowers large (2-2½ inches across); stamens

very numerous, free, golden filaments, with the lower third deep saffron-hued, oblong anthers, spirally twisted, like short sections of fine cord; style exerted, simple, or altogether undivided. A very beautiful saffron-eyed species; hence the specific name.

Vice-President Edwards, seeing it stated in the Cal. Bot. that the *Aralea Californica* "had not been collected in mature fruit," brought a specimen for record. The berries are deep purple, pulpy, symmetrically smooth, and round as the largest shot, or very slightly oblate-spheroid, shortest diameter the axis, consisting of five oblong, semi-oval, compressed seeds, somewhat bluntly margined on the outer more curved edge. The ripe fruit is apt to fall away, or, if retained, is so crushed that the color, form and character to an extent is lost, which may account for the remark.

In Dr. Eisen's collection is a small form of *Madia glomerata*, var. *eglandulosa*, K., worthy of note. Stem simple, 5-6 inches high, cymosely clustered at the top, hirsute throughout, without glands; lower leaves opposite, rarely alternate except above first and second pairs, subspatulate to linear, acute, obscurely three-nerved, base ciliate, subsessile to sessile; heads turbinate, rays 7-9, yellow, three-lobed or deeply three-toothed; disk florets, 7-10, tubes naked, pappus of five or more long plumose awns, receptacle convex, frimbriate, pitted.

Among Dr. G. Eisen's prairie collection, Fresno County, is an exceedingly minute plant, which ought to belong to *Heterocodon*, although, as at present characterized, it is quite at variance.

Heterocodon minimum. K.

Stem filiform, $\frac{1}{4}$ -1 inch high, simple or branching from the base, more or less hirsute throughout; leaves alternate, general outline broadly fan-shaped, three-lobed (save 1-2 of the lowermost round or oval, entire or crenate, often opposite), principal leaves also subdivided into 2-3 lobules, or deeply cleft-toothed, the middle larger lobe broadly cuneate, three-cleft-lobed, the lateral lobes into mostly two lobules; petioles about as long as the lamina, upper-bractoid leaves becoming cuneate fan-form 5-3-two-cleft-lobules, including the confluent stipules, and subsessile to sessile; stipules large adnate to the petiole, stem-sheathing, entire, or 1-3 coarse teeth on each side; flowers axillary, or becoming so, 2-4 from the axils of each leaf, pedicels unequal, about $\frac{1}{4}$ -1 line long, calyx superior (?), herbaceous lobes 3-4, subulate, entire, about as long as the spheroidal tube or capsule; flowers none (hitherto seen); the globose capsule densely hirsute, somewhat constricted at the origin of the calyx segments, which are tipped like the lobules or teeth of leaves and stipules by a long spinulose hair, one-seeded (more?), seed glabrous, pyriform. Rarely a leaf is seen somewhat pinnatifid; those tiny plants are found flowering and fruiting only three-lines high.

Another almost microscopic plant of the prairies of Fresno, collected by Dr. Eisen, is a new

Stylocline acule. K.

Stemless heads sessile on the root crown in the earth, rarely upon it; size of whole plant, $\frac{1}{4}$ - $\frac{1}{2}$ inch (range of fifty specimens); leaves spatulate, oblong lamina, acute, tipped with a black gland or callous, white-woolly, narrow, petiole expanding towards the base; outer scales and seeds as in the generic description; the five inner more rigid ligneous involucre series of scales surrounding the sterile flower, narrower, acute, woolly on the inner face, glabrous outside; the single floret purple tipped; neither pappus nor setiform hairs.

Also among Dr. Eisen's collection we find the matured fruit of a beautiful evergreen shrub, 3-5 feet high, the fruit of which has been hitherto unknown, on which we offer a passing remark. In this specimen of *Leucothoe Davisæ*, Torr., the somewhat erect raceme from the final axils of the leaves is solitary (the embryo buds at the base, however, show that under favorable auspices it would be clustered); the pendulous flowers become somewhat erect at maturity; the lower bracts of the base are short, rounded-cordate, cinnamon brown; the bracteoles above more oblong, acute; the pedicels have also one or two bractlets a little below the calyx, persistent; at length, as the fruit matures, become more or less deciduous; these are ovate acute; capsule depressed, globose; valves thin, dry, chartaceous, almost translucent, subangled and celled, opening loculicidally, each cell 1-2 seeds maturing out of about 12 ovules; seed oblong-ovoid, slightly a little curved, rugose-pitted.

Among Dr. Eisen's plants we find a form of what we take for *Gilia achille-afolia*, var., wherein the stem is very scabrous, and scabrous glandular heads, base, and the leaves, at their axils, woolly; the leaves 2-3 inches long, loosely pectinate-pinnatifid, linear lobes in 3-6 pairs, $\frac{1}{4}$ - $\frac{1}{2}$ inches long (rarely a lobe subdivided); sparsely hirsute, petioles $\frac{1}{2}$ -1 inch long, woolly ciliate; flowers smaller, stamens exserted; style shorter, and stigmas simple, etc.

Sierra Nevada, at 4,000 feet.

Among a package labeled "Vicinity of San Francisco," is a novel species of *Prosartes*. Stem, 1-1 $\frac{1}{2}$ feet high, pubescent, two branched; leaves, 2-2 $\frac{1}{2}$ inches long, 1-2 inches broad, subabruptly, acuminate, somewhat obliquely cordate, closely clasping, pubescent, margin finely ciliate (scarcely scabrous?). Perianth unequal, green or foliaceous, obscurely nerved, base acute; sepals, 2-3 lines long (rarely 4 lines), 1-2 lines broad—the two outer being the largest—outermost, and largest of all, ovate, or obovate, subacute; opposite sepal oblong, subobtusate, the very short base slightly narrowed—the three inner narrower; sepals lanceolate (all more or less obscurely nerved). Stamens scarcely a little unequal exsert. Anthers linear-oblong, slightly enlarged at base, sagittate, glabrous, 1 $\frac{1}{2}$ -2 lines long, filaments somewhat unequal, short, style glabrous, simple. Fruit not known.

Among Dr. Eisen's Fresno plants is *Bæria platycarpa*, Gray. Flowering in March. This shows some latitude of variation from the received description worthy of a passing note. In plants of equal stature the parts are reduced in number; e. g., the involucre scales are only five, instead of 6-7; awns of pappus, 3-4, instead of 7-8; leaves remotely lacinate toothed, three-nerved, reticulate veined, etc.

Among Dr. G. Eisen's Fresno collection is a marsh herb of the *Gratiola*-like group, although quite at variance with the 2-fertile stamened genera and species, with transverse, confluent, or united roundish, or even saggetate anthers; besides, in this plant they are not approximated, nor is the style simple, lips of stigma flattened, etc. The peculiar features, therefore, necessitate generic recognition, whatever may be best deemed their ultimate destination.

Ranapalus. K.

Calyx 5-parted, unequal in size, about equal in length, outer three broadest; corolla bell-funnel form, tube short, throat ventricose with a sub-rotate border, glabrous within, about equally 5-lobed, segments flat, somewhat lipped— $\frac{1}{2}$ upper larger (?)—cleft or deeply emarginate; lower three more spreading; stamens four, all fertile, subdidynamous, erect, distant, subexserted, nearly equal; anthers of two distinct elliptical cells, vertically parallel, fixed by the middle to a flattened subulate simple filament; style straight or scarcely a little curved, nearly as long as the stamens, about equally 2-lobed, stigmas capitate, crenated or toothed (rarely again subdivided); capsule inclosed chiefly by the two largest segments of the calyx, 4-valved, completely 2-celled by the free placenta; seeds covering the whole surface. Generic name from *rana* (frog), *palus* (swamp), its habitat, to indicate its North American representation of the South American genus *Ranaria*, with which it is almost identical.

Ranapalus Eisenii. K.

Roots, fibrous; stem, a span high, dichotomously much branched from the base, lateral branches often prostrate, sarmentaceous, not articulated, compressed, 3-nerved, more or less pubescent, or subglabrous below, almost hirsute above; leaves opposite, sessile, obovate, obtuse to obovate-oblong, often a little oblique, slightly narrowing at the broad base, glabrous, sparsely dotted, fleshy, entire, about 5-10-nerved; peduncles axillary, solitary (or 1-2), compressed, pubescent, about as long as the leaves, $\frac{1}{2}$ - $\frac{3}{4}$ -inch long, 1-flowered. The color of the flower creamy white, chrome yellow shaded throat and tube, indigo blue anthers; capsule ovate-oblong, acute, many seeded, inserted over the broad surface of the placental partition, chiefly along the longitudinal double dark central band of each cell; seeds linear-oblong, slightly narrowing to the base, rough, cinnamon brown, scarcely appendiculate, and very obscurely margined. Flowers, 4-5-lines across, and about the same in length.

The resignation of Theo. A. Blake as Corresponding Secretary, was read and accepted, and the appointment of his successor referred to the Council.

Mr. Harford exhibited curious samples of wool, growing first black, then white, then black again—not colored artificially. Presented by B. P. Flint & Co.

REGULAR MEETING, SEPTEMBER 18th, 1876.

Dr. A. B. Stout in the Chair.

Sixteen members present.

Among donations to library were five volumes, presented by Alfred A. Pinaut. Dr. Stout read the translation of the titles: "Library of American Linguistics and Ethnography" (3 volumes); "Voyages to the Northwest Coast of America," Part I—The Cavern of Aknañh, Island of Ounga, Alaska.

A special vote of thanks was passed to Mr. Pinaut for his valuable contribution.

Botanical Papers.

BY DR. A. KELLOGG.

In Dr. G. Eisen's collection is a small and slender Asteroid, which in general appearance suggests some forms of *Polygonum tenue* or *P. aviculare*. Stem purple at the base and insertion of the leaves, otherwise grassy green.

Aster tenue. K.

Stem perennial, $\frac{1}{2}$ -1 foot high, slightly flexuous, erect, glabrous, compound racemose-panniculate with short, rather closely erect branches, few flowered; flowers very small, 3-4 lines broad; leaves 1-3 inches long, 1-4 lines broad, lower, short, spatulate, mostly entire; higher cauline lanceolate-linear, narrowing into 3-nerved winged petioles, one inch long or less, base half-clasping, minute corneously denticulate remotely above the middle, lamina firm, glabrous, translucently reticulate veined, margins scabrous; size diminishing above into sessile ovate-oblong lance-subulate, near the base of the obconic involucre; scales of the involucre loosely imbricated in 4-5 series, the outer shorter, rigid, green, scarious, entire margins, linear, lance-pointed, violet-tipped apex corneously subulate, often recurve-hooked, inner and inmost, linear, longer, scarious, sharply acute, rays pistillate, rose-red, 20-30 or more in a single row, very minute, slightly exsert beyond the pappus, fertile; disk florets few, about five, filiform tube gradually enlarging to the 5-toothed pinkish border; branches of the style short, subulate, scarcely a little clavate towards the acute apex; akenes linear-oblong, slightly compressed, apparently nerveless, very minutely appressed, pubescent—of the rays, slightly narrowed above and below—of the disk, diminishing from the somewhat truncate top to base; receptacle minute, rather deeply alveolate.

Among Dr. Eisen's collection is a *Ranunculus* quite distinct from *R. Californicus*, Butte, although allied; also from *R. Nelsoni*, var. *tenells*, Gray. The leaves in this, not being pennately ternate, nor any tendency to a trifoliate character, but are continuously trifid, and of like features consistently throughout, to the least bracteoles, where it vanishes.

Ranunculus. Eisenii.

Stem slender, one foot high, base somewhat ascending, thence erect, paniculately branching, glabrous, or subglabrous below, sparsely pubescent above; radicle leaves on very long slender petioles, 6-8 inches, 3-parted, segments cuneate, nerved, trifid, the lobes often again cut-toothed, glabrous, or very obscurely a little pubescent, in general outline broadly fan-shaped with a sub-cuneate base; cauline leaves of like form, on petioles $1\frac{1}{2}$ - $\frac{1}{2}$ inch long, or sessile at the top and at length, the bractoid ones either lobed or filiform linear; the slender peduncles 1-3 inches long, somewhat pubescent; sepals yellow, ovate-oblong, acute, slightly pubescent, strongly reflexed, shorter than the petals, oblong-subobovate; flowers about 6-lines broad; akenes smooth, scarcely a line long, a little flattened, edges from sharp becoming somewhat obtusely rounded, beak strong, short and recurved; heads compact globular, 2-lines in diameter.

Scutellaria Bolanderi, Gray., in Dr. A. G. Eisen's collection, have ovate leaves, or perhaps ovate-oblong, and all are essentially on petioles, 3-1-line long, in 1-2 of the topmost pairs (out of twenty-five pairs) only subsessile—all distinctly serrate, with coarse truncate teeth below the upper third.

Clematis ligusticifolia has from 4-6 or 8 sepals, top of the climber pubescent, leaves 2-6 inches long (petioles) of 3-pairs and odd leaflet, the lower pair again ternate, pubescent beneath and on the margins; genitals scarcely half as long as the sepals (exceptional?); outer filaments widely flattened or petaloid.

In *specularia biflora*, Gray, Dr. Eisen's specimens exhibit some features worthy of note. Stems ascending, branching from the base, angled, short reflexed; strigose or strigulose-hispid along the angles, chiefly below, only scaberrulose backwards above; lower leaves obovate obtuse, more or less decurrent into petioles $\frac{1}{4}$ -inch long, or about half the length of the lamina to very short, and so sessile to clasping (3-6 inches above the base); flowers 1-3 in the axils; otherwise as described.

Dr. Burleigh presented to the Academy's Herbarium a small *Gentiana*, of the stipitate group, closely allied to *G. glauca*, from St. Paul's Island, Alaska, but as in the description of that species no notice is taken of the denticulate lobes of the flowers, etc., we furnish the following description:

Gentiana glauca, var. *Paulense*.

Stem $\frac{1}{2}$ -2 inches high, erect or ascending, often branched from the base; perennial root of creeping and thickened fibres; lower leaves obovate-cuneate, decurrent into short-winged petioles, above ovate sessile, about $\frac{1}{4}$ -inch long, $\frac{1}{4}$ -inch wide, fleshy, smooth on the margin, 3-nerved and reticulated base, con-

nate and short-sheathing, approximated or crowded, the final leaves colored, bracted and involucrate to the terminal fascicle of 3-6 flowers, besides a few axillary and solitary below. The calyx is tubular-campanulate 4-lines long, upper portion somewhat inflated, membranaceous, colored (blue, like the flowers); teeth unequal, about $\frac{1}{4}$ - $\frac{1}{2}$, the tube somewhat triangular, base thence acute, smaller segments linear-lance subulate; corolla tubular, slightly inflated above the calyx, but again a little constricted at the throat, lobes five, very short, $\frac{1}{4}$ - $\frac{1}{2}$ the flower, ovate, subacute, margins minutely denticulate, beardless within, infolded and entire at the simses, $\frac{1}{2}$ - $\frac{3}{4}$ -inch long, 2-lines broad; filaments from half a line becoming 4-6-lines long, anthers saggitate oblong acute; ovary elliptical, as long as the stipe; seeds minute, scarcely oblong, rough, very obscurely wing-girded.

Description of three New Species of Sessile-Eyed Crustacea, with remarks on *Ligia occidentalis*.

BY W. G. W. HARFORD.

Ligia occidentalis. Dana.

In some alcoholic miscellanea sent from Magdalena Bay, L. C., by Mr. W. J. Fisher, we found thirty to forty individuals of the above species, which agree sufficiently well with Prof. Dana's description of *L. occidentalis* to be readily referred to it, although some points of difference between our specimens and the Professor's definition of that species, may be of interest.

According to Dana's description, the number of joints in the flagellum of the outer antenna is from 16 to 18. I have counted the joints in the flagella of six individuals, with the following result: 28, 26, 28, 24, 24, 28. The specimens from Lower California do not clearly show the coloration often so conspicuous in individuals of the same species found on the shores of our bay, yet it is evident upon a close examination. The irregular black dots on the limbs of this species are very constant, and in form suggest Arabic characters.

Dexamine scitulus, n. sp.

Upper antenna longest, the short third joint of its peduncle extending to the middle of the third joint of the lower. Second joint of the lower antenna about one-third longer than the corresponding joint of the upper. Flagellum of lower antenna ciliate on lower side. Eyes small and indistinct. First gnathopoda weak, hand of second obovate, carpus slightly produced inferiorly with a bundle of setae on the same edge. Telson single.

Length, 1 inch.

Dredged in six fathoms Magdalena Bay, Lower California, by Mr. W. J. Fisher. My description is made from a single specimen. It is the most beautiful amphipod I have yet met with, and when first taken from the water must have been a most attractive object. Color light purple, with deeper dottings of the same color on the epimera. I regret that more of this inter-

esting species were not received, that I could have furnished the Academy a good series.

Idotea marmorata, n. sp.

Body rather slender; outer antenna about half the length of the body; fifth joint nearly equal to the united length of the third and fourth. The posterior margin of the cephalon and the anterior margin of second segment, dorsally contiguous. Four first segments of the pereion equal, and about one-third longer than either of the following. The emarginated caudal shield is longer than the four preceding segments.

Length, $\frac{1}{2}$ in.

I place the above species in the genus *Idotea*, in which Milne Edwards includes *Stenosomæ* and *Siduria*, of Leach, and the *Leptosomæ*, *Hebe*, *Oiskæ*, *Zenobia*, and *Armida*, of Risso. Our specimen possesses the long antenna and somewhat slender form of *Stenosomæ*. The suture between the first and second segments of the pleon is just discernible at the lateral outline only, no trace of it being visible when viewing the caudal plate from above. Our specimen was collected and sent to us by Mr. W. J. Fisher, from the west coast of Lower California. It is a very pretty species, its marbled coloration suggesting the specific name we have given it.

Idotea muricata, n. sp.

Outline elliptical. First four segments of the pereion equal, the last three decreasing gradually; each segment traversed by a transverse dorsal ridge, bearing three muricoid spines, between which and the lateral margin of each segment are from four to six small tubercles. Abdomen rapidly narrowed to an obtuse, horn-like point. Eyes prominent. Antenna not seen.

Length, $\frac{7}{8}$ in.

The species above described was obtained by Mr. W. J. Fisher, from Icy Cape, about three years ago. Its very rough dorsal surface clearly distinguishes it from all other members of the genus with which we are acquainted; in fact, it differs so greatly from all species of *Idotea* we have hitherto seen, that we were inclined to form a new genus for its reception; but as no less than seven genera are included in *Idotea* by M. Edwards (and subsequently by Bate and Westwood), of some of which we have not seen the descriptions, we have placed it as above. Our single specimen is without antenna, they having been broken off in transit.

The eyes are prominent, and in advance and above each is an irregular shaped and apparently hollow spine, posterior to the frontal outline of the head, at a distance equal to their height. The cephalon, like the body, possesses the same rough tuberculose character.

The Secretary read the introduction of a paper "On the Determination of the Constant *g*," communicated through the Corresponding Secretary by E. Dyer.

Thomas Guerin spoke of the cost and weight of conduit pipe, and suggested, that, as there was so much difference of opinion among inquirers with reference to the subject, a discussion would be serviceable at a future meeting.

The appointment, by the Council, of Dr. A. B. Stout as Corresponding Secretary for the unexpired term of Theodore A. Blake (resigned) was announced.

REGULAR MEETING, OCTOBER 2D, 1876.

Vice-President Hyde in the Chair.

The Chairman stated that a communication had been received from the Society of California Pioneers, inviting the Academy to attend the funeral of James Lick.

The following gentlemen were appointed pall-bearers on behalf of the Academy: Henry Edwards, Henry C. Hyde, Charles G. Yale, C. D. Gibbes, C. Troyer and S. P. Christy.

Mr. R. E. C. Stearns addressed the Academy as follows:

MEMBERS OF THE ACADEMY: It is customary, in societies like this, upon the death of a member, to formally announce the fact and to record the same in the proceedings.

In pursuance of this formality, it has been assigned to me to tell you what you have already heard, and what half the world has already learned through the telegraph and the printing press, that JAMES LICK, our friend and benefactor, has passed away. He died peacefully at one o'clock yesterday (Sunday) morning, October 1st, at the advanced age of eighty years.

It is eminently proper that we should speak in praiseful language of the dead, for, aside from a general feeling of gratitude for his munificent benefactions, which would justify our eulogy, he was one of the earliest members of the Academy, and always

expressed the most friendly interest in its affairs, a warm appreciation of its objects, as well as a generous sympathy for those who were unselfishly working to build up a scientific organization, and to advance the cause of science on the western shores of our country.

Though not educated in those higher schools where the mind is trained to scientific study and thought, his native breadth of mind was nevertheless quick to perceive the lofty aims and grand successes of Science, and the many blessings she has conferred upon mankind.

If we examine into the character of his numerous gifts and the objects he designed to subserve thereby, we find that he acted consistently and in perfect harmony with the sentiment I have indicated, and which governed him in the division and varied dispensation of his exceeding wealth.

Whatever may have been his idiosyncracies, his varying moods of temper, his mind was clear and logical as to how or in what manner his fortune could be best apportioned, and it was bestowed thoughtfully and in pursuance of long cherished convictions. He loved his country, and the sentiment of patriotism incited him to dedicate a portion of his means to the perpetuation, by a monument, of the memory of the author of "The Star Spangled Banner." He was proud of his adopted State and city, hence his gift for a group of statuary illustrative of the settlement and growth of California. He was, during a portion of his life a mechanic, hence the endowment for a school of instruction in the mechanical arts and his gift to the Mechanics' Institute. Himself one of the earliest settlers in the State, he cherished the Society of California Pioneers, and made it and them participants in his bounty. With a high regard for Science and a warm friendship for our Society, he remembered the dubious days in its history; he was familiar with our embarrassments, and not unmindful of our poverty; he had witnessed our "struggle for existence," and gave us with a generous hand.

So, to the University of California, in which he has endowed an Astronomical Department, which is to bear his name, with a princely gift of the value of nearly three quarters of a million of dollars. And so on through the long list of his benefactions we find maturity of design, and a sagacity in the selection of

beneficiaries, which indicate a clear head and an enlarged and generous purpose. A great writer has said:

"The evil which men do lives after them;
The good is oft interred with their bones."

This is no unmeaning platitude, but it can be said in truth that it does not apply to him of whom we are speaking.

It may be said by some that our late member, in the bestowal of his gifts, was governed by a common weakness, the desire to perpetuate his name. Concede this, and what then? Is this unnatural, or is this an exceptional case? It is safe to say that the world will readily forgive a vanity which exhibits so noble a form of expression. It is equally safe to assert that the name of JAMES LICK deserves and will receive an honorable place on the roll of great public benefactors; and that those who succeed us in the affairs of this Academy, and who will be especially benefited by the means and facilities for scientific research through the considerate bounty of JAMES LICK, and who will thereby be enabled to contribute something to "the sum of human knowledge," will ever hold his name in grateful remembrance.

The following resolutions, offered by Mr. Stearns, were adopted:

Resolved, That the members of the California Academy of Sciences have learned of the death of their fellow member, friend and benefactor, JAMES LICK, and will ever hold his name in grateful remembrance.

Resolved, That the Academy of Sciences accepts the invitation of the Society of California Pioneers, and will attend the funeral in a body; and it is further

Resolved, That a suitable record of the death of JAMES LICK be entered in the minutes and published in the proceedings, and that the Academy do now adjourn, without transacting further business.

In Memory of
James Lick.

REGULAR MEETING, OCTOBER 16TH, 1876.

Dr. Blake in the Chair.

Donations to the Museum: From C. F. Kirchner, specimen of silver ore; from G. A. Treadwell, variegated copper ore, from Mexico; from Dr. J. L. Ord, three specimens of Monterey marble; from C. D. Gibbes, specimens of coal, gypsum, conglomerate, terra alba, gum demar, catechu and chrome iron; from Henry Edwards, specimen of serpentine; from J. W. Glass, two specimens of quartz containing asbestos, also specimen of cat's-eye; from Wm. McGillwray, Indian mortar and pestle from Big Panoche Valley; from R. H. Stretch, a cabinet containing about 600 specimens of minerals.

A special vote of thanks was given to Mr. Stretch for his fine donation.

Pacific Coast Lepidoptera.—No. 18. Description of a New Species of *Heterocampa* (Larva and Imago).

BY HENRY EDWARDS.

The following interesting species was detected by me in the fall of last year, feeding upon willows, in the neighborhood of Mt. Shasta, making the second of the genus now known to inhabit California:

Heterocampa salicis, n. sp. Hy. Edwards.

Larva, Mature. Ground color, bright golden yellow with subdorsal, longitudinal bands of clear white. Head, bright vermillion red, rather small, grooved in centre, with a small fovea in front. Second, third, and fourth segments, with broken black lines, those on the sides occasionally edged with white, each segment with two long spinous tubercles. Fifth segment, bright vermillion red, much swollen dorsally, and bearing eight spinous tubercles. The remaining segments are all striped longitudinally with slightly waved black lines, broken up on the sides into a series of dots. Anal segment, with ten warty spinous tubercles, without white, and all the lines obsolete. Feet and legs, yellow, spotted with black. Mouth parts, black. Spiracles very small, black. Each of the warty tubercles is furnished with a single dirty white hair.

Length, 1.25 inch.

Six caterpillars taken, all feeding close together, upon a dwarf willow, their brilliant colors giving to the plant at a little distance the appearance of a raceme of showy flowers. In a few days they began to undergo their change, and by the 27th of August had all transformed. The cocoon is formed of very close, fine, glossy silk, the leaves of the plant being drawn around it so as to conceal it entirely. It is almost egg-shaped, and very symmetrical.

Chrysalis. Short, broad, bright, chestnut brown, very glossy and shining, the abdominal portion showing the few hairs of the larval tubercles.

Length, 0.65 inch.

The perfect insects began to appear on the 22d of December, a second followed on the 9th of January, and the third on the 16th of March. The remaining specimens all died in the chrysalis state.

Imago. Head and thorax, clothed with dense iron gray hairs, the latter towards the base changing into rich chestnut brown, mottled with fawn-color. Abdomen, stone drab, paler at the base, with the anal tuft fawn-color. Antennæ, with the shaft stone drab, the pectinations yellowish brown.

Primaries. Pale fawn-color, densely clothed with white scales, scattered somewhat irregularly, thickest towards the costal edge, and there forming an imperfect streak. Inner margins, darker, and with rich brown blotches, continued faintly to the posterior angle. At the base of the wings is also a conspicuous, somewhat saggitate patch of the same rich brown color. Fringes, white, mottled with brown. Secondaries, whitish drab, with brown markings near the anterior margin, and a brown blotch near the anal angle.

Underside. Dull whitish drab, shading into brown on the costal edge of both wings. Fringes of primaries, mottled with brown; of secondaries, pure white.

Expanse of wings, 1.55 inch.

This species differs considerably from its congener (*Het. conspecta*, Hy. Edw., Proc. Cal. Ac. Sci., Sept., 1874) in its more irregular markings, in the absence of any defined bands or spots, and in the darker base of the primaries. Both species appear to be rare, and are as yet known only by the specimens in my collection.

Dr. James Blake read the following paper on

Remedy for the Phylloxera.

My attention having been directed some months ago to this new pest which so seriously threatens the destruction of our vineyards, a series of experiments was undertaken under my direction at one of our largest vineyards in Sonoma County, with the view of discovering some means of checking the progress of the disease, as it has already almost destroyed some of the most promising vineyards in that locality. At the time of commencing my investigations I was aware that the subject had occupied the attention of some of the most distinguished scientists in France for the last three or four years, nor should

I have entered on the investigations with any hope of success had I not known that the efforts of these gentlemen seem to have been directed to the destruction of the insect without having acquired sufficient knowledge of its natural history. So far as known, the insect is one which goes through a series of generations without changing its form, during which many thousands of insects can be produced from a single impregnated ovum (75,000,000 have been calculated), but after a certain number of these parthenogenic generations of the power of non-sexual reproduction ceases, and the development of a new form becomes necessary for the continuation of the species. This alternation of generations takes place in many of the lower tribes of animals; the different generations of the same animal being in some instances so dissimilar as to have been mistaken for different species. In the phylloxera the forms usually met with, or, at least, that had been described when I commenced my investigations, were two non-sexual forms, the nymphs and nurses, the former being a small insect with legs which allow a certain degree of locomotion, the latter being a form in which the legs are so slightly developed as to be hardly visible, so that the insect can move but a very short distance from the spot where the ovum is deposited. Besides these two non-sexual forms, whose life is entirely subterranean, there is a winged form in which the two sexes are developed, and which passes the greater part of its existence above ground. Within the last few months it has been discovered that this winged insect deposits its eggs on the leaves and bark of the vine, and from these eggs it is probable that a new generation of nurses and nymphs arises which, at least for many generations, propagate themselves on the roots of the vine without any males being produced. There were two important questions relating to this winged form of the insect which had not been decided—namely, whether they deposit any eggs on the root or bark of the vine under ground, and the form of the insect that is first produced from the impregnated ovum. These questions have an important bearing on the means to be taken for the destruction of the insect, but unfortunately neither of them had received a satisfactory answer. In the spring of this year I presented some specimens at the Microscopical Society, of a form of the insect that had not been described. In my frequent examination of the roots of diseased vines during the winter, the insect was only met with under the form of nurses, which remained in a dormant state from the beginning of November to April. The first sign of a renewal of activity in the insect was the appearance of a form much resembling the nymph but rather larger, with a sort of gelatinous body, and so transparent that from ten to twenty ova could readily be distinguished in the abdomen. It was much more active than the nymphs, running about the roots with agility. My own opinion is, that it was a form of insect directly developed from the impregnated ovum, but whether it had been hatched above the ground and had traveled down on the root, or whether any impregnated eggs had been deposited beneath the surface from which it had been produced, is not known. The same form of insect was described by Mr. Balbiani at a meeting of Académie des Sciences at Paris, about two weeks after I had exhibited it at the Microscopical Society. On seeing this form of the insect, the idea at once struck me that this was the phase of its existence in which it could

most readily be destroyed, and believing that this form was one which was necessary for the continuation of the species, its destruction would necessarily be followed by the disappearance of all the other forms.

The bisulphide of carbon seemed to present the only agent likely to be efficacious against the insect. Owing to the extreme volatility of this substance, its vapor, when it is introduced at some distance beneath the surface, would permeate the earth in all directions over a considerable area, and thus would have a chance of reaching even the distant rootlets of the vine. Although it had been reported in France that the substance was not destructive to the insect, yet I believed that the soft, apparently nude form, which I had just discovered, would not resist it. In order to introduce the substance beneath the ground, an iron tube was taken with a sharp steel point at one end, the sides being pierced with a few small holes near the bottom, and a piston was made which could be forced down the tube. The tube was driven into the earth for a distance of one or two feet, near the root of the vine; some bisulphide of carbon was poured into the tube, which was then filled with water, and the contents of the tube forced out into the ground with the piston. The tube was then drawn out and the hole filled up. The quantity used on each vine was about an ounce and a half of the bisulphide. This was introduced into the ground through two or three holes. The substance was applied in the end of April and early part of May, only one application being made, and in every instance to plants that were evidently suffering from the disease. The result has been, on the vines so treated the insect has almost entirely disappeared, while on vines that were in the same condition last year as those to which the bisulphide had been applied, but which were not treated, the roots swarm with the insect, so that none of them are likely to survive this season, at least of those that were most affected. In the early part of the season no great difference was noticed between the foliage of the vines that had been treated and the others, but within the last six weeks the vines on which the insect had been destroyed present a decidedly healthier appearance. A more marked difference is observable in the roots, specimens of which I submit for inspection. It will be seen that while the roots of the vines to which the bisulphide has been applied present a comparatively smooth and healthy appearance, the roots of the untreated vines are rough and covered with dead and decaying bark. In both sets of roots the lower portion is generally dead, the result of the ravages of the insect during the last season; but while in the plants which are still infested with the insect this process is still going on and will continue until the vine is destroyed, the other roots are throwing out quite a number of healthy rootlets and are covered with a new and smooth bark, so that they will be prepared in the ensuing year to throw out a new crop of rootlets.

As regards the practicability of the treatment this presents no obstacle, as the bisulphide of carbon can be obtained now in a comparatively pure state at fifty cents per pound; and I am confident it can be produced in a form quite suitable for use in the vineyard at a third of the price, so that the cost of the material for each vine would not exceed two or three cents. The process of applying it is simple, and can be carried out by any ordinary laborer. The

time for applying it should be during the month of April, as at this season the insects that have survived the winter have not begun to lay their eggs, and experiments that have been carried on during the summer show that while the bisulphide is a certain poison to the insect in all its forms it does not destroy the egg. This is the reason of its reported failure in France, where probably it was not applied at the right season. By using it in the spring, at the time that the winter eggs at the surface are being hatched and before the hibernating form has commenced laying, we have the insect entirely in that phase of its existence in which it can be killed by the bisulphide; and experience has shown that at this time its destruction is completed by one application of the poison. The only place where the insect has been found on some few of the vines treated has been near the surface, where the vapor became too much diluted with the air to prove fatal, and one patch of the insect was found at a depth of more than four feet, where it was possible the vapor had not penetrated. In the course of my experiments I have discovered that the refuse lime from the gas works will kill the insect for some distance beneath the surface when it has been applied round the roots, and from what we know of the natural history of the insect it is almost certain that it will shortly die out at any great depth, when it cannot be renewed by fresh nymphs developed from the winter ova. The plan of treatment I have advised for the diseased vines is, during the winter, and as late as possible before the cessation of the rains, to apply three or four pounds of the lime refuse round the stem, drawing the earth away from the stem to the depth of two or three inches, at the same time brushing the stem for six or eight inches above the ground with train oil. Then about the middle of April to the first week in May use the bisulphide of carbon under ground in the way I have pointed out, making three holes round each vine at a distance of eighteen inches from the stem, and using about two-thirds of an ounce to each hole, the holes when the tube is withdrawn being well filled with earth and stamped down.

When the vine is so far diseased as to have suffered materially in its foliage, the better plan is, I think, to pull it up. But a careful examination will detect the presence of the insect on the roots of vines the foliage of which appears quite healthy and which are bearing a full crop of fruit. In this stage of the disease the insect is not in sufficient numbers to so completely absorb the descending sap as to have prevented the formation of new rootlets, and while this is the case the vine can readily recover itself. Whatever may be the case in other countries, I am convinced that here the destruction of the lower portion of the roots is not caused by the direct attack of the insect, as I have found the roots dead two or three feet beyond where any traces of the insect could be discovered. Owing to the peculiarities of our climate, the vines send their roots much deeper here than in Europe, and although in the older vines in the vineyard where I investigated the disease the roots derived their principal supply of nourishment at depths from six to ten feet, I have not found the phylloxera at a greater depth than four feet, although the roots were dead as far as they could be traced, and far beyond any part that had been directly attacked by the insect. Where the vines are pretty badly diseased, I think the application of the bisulphide at the beginning of the winter,

say in November, would more than repay the expense, as thousands of insects would be thus destroyed that otherwise would be feeding on the juices of the vine during the next five months. This, however, must not supersede the use of the poison in the spring at the time when the winter eggs are developed.

In the roots shown this evening the healthy appearance of the new rootlets on the treated vines is a sufficient proof of the absence of the phylloxera, although I would state that after a careful examination I have not detected a single insect. The roots that were not treated have not thrown out a single rootlet. It is needless to remark that the vines that were treated all showed evidences of being attacked by the disease last season, as is evident from the appearance of the roots, although not an insect is to be found on them at present.

Where the vines have not been already attacked, I believe the application of train oil to the stem and the gas works lime to the surface round the top of the root will protect them, or a small quantity of the bisulphide introduced near the root a few inches beneath the surface in the spring, would certainly save them from the attack of the insect.

Mr. Guerin read a paper on the Factor of Safety in Water Pipes.

REGULAR MEETING, NOVEMBER 3D, 1876.

Dr. Stout in the Chair.

Ten members present.

L. A. Scowden was proposed for resident membership.

Donations to the Museum: From W. J. Fisher, specimens of *centropomus*, *trachynotus pampanus*, octopus, 22 birds and 110 shells; from J. M. Dore, specimen of *echeneus maceatus*; from Henry Edwards, two fish—one mineral and slab containing fossil; from John Torrence, California gopher.

The President transmitted to the Academy a short paper, dated October 12th, upon the recent search for Vulcan. LeVerrier's telegraphic dispatch asked observers upon the Pacific Coast to make search for Vulcan on the 9th and 10th of October. Professor Davidson was then stationed at the U. S. Coast Survey trigonometrical station, Mt. Helena, at an elevation of 4343 feet above the sea, and had been systematically observing the sun for sun spots and planet from the 6th of October. On the 9th and 10th the disc of the sun was very carefully and frequently examined with a good telescope of three inches aperture and a magnifying power of 85, adjusted for the determination of position of any object on the Sun's surface. Especial care was given to the afternoon hours when the sun was below the horizon to the eastern observatories. Late in the afternoon of the 10th two small spots were discovered, and from their size and want of definiteness it is safe to say that any well defined dark object having a diameter of ten seconds of arc would have been readily detected.

Professor Davidson states that his examination of the sun's disc before the request of LeVerrier was made known, arose from tentative studies which he had been making upon the action of Mercury, Venus, Earth and Jupiter, (together with a probable intra-mercurial planet,) upon the fluid surface of the sun in not only changing its form and causing solar spots, but in the almost infinitesimal reactionary effect of the very slightly distorted form upon the planets, and especially upon the yet unexplained variation of the earth's rotational velocity, which he surmises may have a period of about forty years.

A description of a fish caught at Port Madison, W. T., was submitted by Ferdinand Westdahl, through Prof. Geo. Davidson.

Pacific Coast Lepidoptera.—No. 19. Notes on a Singular Variety of the Larva of *Halesidota Agassizii*. Packd.

BY HENRY EDWARDS.

It has generally been conceded by entomologists that variation of certain characters in either of the stages of insect life, so long as that variation is contained within what has been called the "well defined limits of a species," does not constitute a ground for founding new species upon trivial differences. But *remarkable* changes in the larvæ of certain forms are decidedly the groundwork upon which other ideas may arise, and are the beacons which light us to a better understanding of the laws which govern the many developments of animal life, which, with their almost countless variations, lead us to the conclusion that our positive knowledge of what really constitutes a species is very limited in extent, and compel us to the confession that we can say but little as to where a species is true to its original type, or how far its wanderings may extend. It is a singular fact that the genus *Halesidota* should present two kindred instances of the variation of the larval stage to such an extent as almost to warrant the assumption that new species had in these cases begun to assert their existence; but it is nevertheless so, the one to which I am about to refer being even more remarkable than that spoken of by the late Mr. B. D. Walsh, in Proc. Boston Soc. Nat. Hist., Feb., 1864, and further alluded to by him in the Proc. Ent. Soc., Phil., Nov., of the same year. To those who are not familiar with Mr. Walsh's papers, it may be briefly stated that he found feeding upon oak some larvæ of this genus, differing very much, both in color and in the arrangement of the pencils of hairs, from those of the well known Atlantic species, *H. tessellaris*, but which, upon arriving at their perfect state, could not possibly be distinguished from the imagos of that species. Mr. Walsh, regarding the larval condition as of equal value with the subsequently matured form, called his new discovery by the name of *H. Antiphola*, and always referred to it as a phytophagic species, and not a phytophagic variety. Mr. Grote, on the other hand, in Proc. Ent. Soc., Phil., December, 1864, alludes somewhat slightly to Mr. Walsh's experiments, and considers the *Antiphola* of the latter author as merely an accidental variety of the better known and more abundant form; and this, it is but fair to say, is the conclusion arrived at by most other entomologists. It gives me great pleasure to be able to add some few facts bearing upon this interesting question, and to present the description of some larvæ, which, at the time of their capture, certainly appeared to me to be those of a totally new and undescribed species, but which, in their imago condition, can in no possible character be distinguished from the well known California species, *H. Agassizii* of Packard, = *Phægoptera salicis*, Bois. My specimens were taken by myself in August, 1865, in Strawberry Valley, near Mount Shasta, one of them feeding upon alder (*Alnus viridis*), and the other upon a species of willow. For the better comparison of the singular

differences in the larvæ, I subjoin, in parallel columns, the description of both:

Hal. Agassizii.

Head, body and prolegs, entirely black. Abdominal legs, dirty yellow. Body, slightly depressed, with the three anterior and three posterior segments evenly clothed with velvety black hairs, out of which spring some pencils of white hairs, much longer than the general clothing of the body. The middle segments are clothed with very bright lemon yellow hairs, with a black lozenge-shaped patch in the middle of each segment. In some specimens the yellow extends further, both anteriorly and posteriorly, the black hairs being consequently less; but there is little or no change during the growth of the larva, save in size, the colors being quite similar through the successive moults.

Hal. Agassizii. Var. *Alni.* Hy. Edw.

Color of body, cream white, except the head, which is jet black. Bundles of hair of the same form and arrangement as in *H. Agassizii*, but wholly of a beautiful cream white, concolorous with the body of the caterpillar. Down the middle of the dorsal region, is a row of oblong, bright red, almost vermilion, lozenge shaped bundles of hair, wanting on first, second, third and anal segments.

Length, 1.00 inch.

Previous to the last moult, the caterpillars became very dull in color, and the subsequent condition was seen through the larval skin prior to its exclusion. The appearance then presented was much closer to the usual form of *H. Agassizii*, but with a few striking differences. The body was now wholly slate black. Head, jet black, shining. Mouth parts, black, with a streak of cream color above them. 2d, 3d, 4th, 5th, 9th, 10th, 11th, 12th and 13th segments, as in *H. Agassizii*, clothed with jet black hairs, with long white pencils interspersed. The middle segments, that is, the 6th, 7th and 8th, are bright golden, and not lemon yellow, without any black hairs whatever. Thoracic legs, black; abdominal, dull yellow.

It will thus be seen that the great difference of these larval forms consists in the stages previous to the last moult, the typical one being then lemon yellow, with black extremities, and black dorsal hairs, while the other is cream white, with vermilion dorsal hairs. Moreover, the last moult of my new variety is apparently specifically different from the normal form, the yellow being a much deeper and richer tint, and the black bunches of dorsal hairs being utterly wanting. It may be well to state that *H. Agassizii* feeds exclusively upon willows, whereas my Shasta examples thrived equally upon willow and alder.

They were found on the 17th of August, changed from the white and red stage on the 26th, and spun their cocoons on the 14th and 16th of September. In this condition there was no appreciable difference, except that the golden hairs gave rather a richer appearance to the cocoon. The moths emerged on the 1st and the 15th of March, both being females, and presenting, as I have said, no points of distinction from the ordinary coloring and markings of the typical species. For the sake of reference, I propose for this variety the name of *Hal. Alni*.

REGULAR MEETING, NOVEMBER 20TH, 1876.

Vice-President Edwards in the Chair.

Nineteen members present.

Donations to the Museum: From G. A. Treadwell, specimen of inetacinnatarite, Lake County, Cal.; from Henry Edwarus, silver ore and fossils from White Pine, Nev.; from C. D. Gibbes, stamp copper and fine copper, Penabic mine, Michigan; fossil shells, Fresno County, Cal.; sandstone and infusorial earth from same place; petroleum from Gibbes' oil spring, with samples of burning and lubricating oils, Fresno County; asphaltum from naptha oil springs, Kern County, Cal.; from G. Yale Gay, lusite, from Soda Lake, Churchill County, Nev., also manufactured product; from C. L. Scudder, Arizona rubies; from Mrs. Elizabeth Bush, San José, 40 specimens of copper ore, 20 specimens sulphuret of iron, and sulphurets of zinc, from Buchanan copper mine, Fresno County, Cal.; 20 specimens andaluriate crystals from near Buchanan mine; 23 specimens crystals of calcite anceforsil shells, from Penitensia Cañon, Santa Clara County, Cal.; three specimens rock from Black Spring, Penitencia Cañon; three specimens of sandstone; two specimens of conglomerate, containing andalusite crystal; 13 crystals (California diamonds), Lake County, Cal.; fibre of milk weed, Fresno County; one pine and two spruce cones from Glen Falls, N. Y.; from Asa T. Hayden, Honolulu, land shells and fresh-water shrimps from the inormtum streams.

Mr. Lockington described a species of lizard from Lower California.

Dr. Kellogg read the following paper:

On a recent visit to Mendocino County, Mr. Joseph H. Clarke, our corresponding member and enterprising collector and contributor in several departments of natural history, gave some plants, and among them is found a new species of *Isopyrum*, which it is proposed to name in his honor.

Isopyrum Clarkii. K.

Stem simple, filiform, glabrous—rarely more than one—1-3 inches high, 1-flowered; root, a fasciculus of oblong sessile tuberlets; leaves biternate, radicle leaf on a long slender petiole, the leaf or leaves about equaling the stem, rarely exceeding it. Cauline relatively shorter, stipules minute, petiolules very short, leaflets broadly obconic, 2-3 cleft lobed segments oblong, obtuse, mucronate, base cuneate, about 2-3 lines long and 1 broad, somewhat glaucous beneath; flowers on long filiform terminal peduncles, white, 4-lines in diameter; sepals oblong-obovate, subobtusate; stamens 9-10, filaments lance-linear, flattened, somewhat petaloid—not dilated above—two-thirds the length of sepals; follicular ovaries 5-6, oblong, flattened, about 3-seeded, on stipes one-third their length. Differs from *I. occidentale* in its size and simple 1-flowered character, pods stipitate, 3-4 seeded, and more distinctly separate stipules; the roots also are not the thickened fibres of that species, but true oblong little tubers. Growing among mosses.

The following plant of Mr. W. J. Fisher's collection at San Diego, is so rare—if not altogether new—it is proposed to make it known provisionally as a variety of Dr. Gray's.

Actinolepis mutica. var.

Stem erect, simple, oppositely branching above into a loose somewhat corymbose spreading top, canescently villous, with short glandular hairs throughout, more or less mixed with long simple hairs above; leaves opposite (upper sessile), 1-2 inches long, pinnatifid, filiform, or narrowly linear lobes from a somewhat broadened rachis, or margined petiole, rather palmately multifid as reduced on the branches; peduncles slender, 2-3 times the length of the leaves or 1-2 inches long, solitary and terminal, a few from the upper axils, involucre broadly bell-shaped, scales about 12, or same number as the rays, acute tips hispid and glandular somewhat recurved, loosely appressed carinated to the middle; rays longer than the scales; akenes linear-cuneate, black, minutely scabrous, of the ray incurved; pappus very minute, about 5-8, obtuse, lacinated membranous or hyaline scales; receptacle sharply conic finely papillose-pubescent; disk florets yellow, glandular, tips of the teeth bearded on the back and nerves each side of the sinuses often produced into minute spines; branches of the style tipped by a short naked cone.

C. D. Gibbes read a paper describing the geological formation of the oil region in Tulare Valley, west of Tulare Lake, exhibiting also specimens of the oils and rocks.

A paper was submitted, through Dr. Kellogg, by Prof. G. Eisen, entitled, "A preliminary report on the Lithobii of North America."

Lithobioidæ Americæ Borealis.

Preliminary Report on the Lithobii of North America.

BY ANTON STUXBERG.

The oldest account, as far as I know, of the occurrence of Lithobii in North America is dated about fifty years ago, when Thomas Say, in the year 1821, in his "Descriptions of the Myriapoda of the United States," (Journal of the Academy of Natural Sciences of Philadelphia, 1st series, vol. 2, pp. 102-114) described a species found in the vicinity of Philadelphia, under the name of *Lithobius spinipes*.

Next to Say comes George Newport, who (1845) in his classical work "Monograph of the class Myriapoda, order chilopoda," (Transactions of the Linnean Society, vol. XIX, pp. 265-302, 349-439,) described as being found in the United States, three species: *Lithobius multidentatus*, *L. Americanus* and *L. planus*; of these Newport considers, however, not without some doubt, *L. Americanus* to be identical with *L. spinipes*-Say; and according to my opinion this same *L. Americanus* is no other species than the one in Europe so exceedingly common, and well known since the time of Linneus, as *L. forficatus* (Linneus), not to mention a very short communication by Perbosc in Revue Zoologique, 1839, page 261, where a supposed new species *L. Mexicanus* is very unsatisfactorily described.

When Ludwig Koch, in the year 1862, published his monographic treatise on the genus *Lithobius* (Die Myriapodengattung *Lithobius*, Nürnberg, 1862,) he also described as new two North American species: *L. transmarinus* and *L. mordax*.

Shortly afterwards, 1863, we find by Horatio C. Wood, Jr., under the title: "On the chilopoda of North America, with a catalogue of all the specimens in the collection of the Smithsonian Institution," (Journal of the Academy of Natural Sciences of Philadelphia, new series, vol. V, pp. 5-52,) the beginning of a monograph of the myriopods of North America. Of Lithobii he enumerates not less than seven species: *L. multidentatus*, *L. Americanus*, *L. paucidentis*, *L. planus*, *L. nobilis*, *L. Xanti*, and *L. bipunctatus*, of which the three last mentioned are arranged under a separate Genus *Bothropolys*, distinguished from the old genus *Lithobius* Leach, by the arrangement of poricoxales in several more or less irregular rows.

In his principal work of somewhat later date, (1865), "The Myriapoda of N. America," (Transactions of the American Philosophical Society, new

series, vol. XIII, pp. 137-248,) he however, after continued study and with access to the necessary material, somewhat modified his former ideas of the N. American Lithobii, as can be seen by a comparison between the species mentioned in his two different works of the years 1865 and 1863.

(Genus LITHOBIUS, Wood.)

1865.		1863.
<i>L. Americanus</i>	=	{ <i>L. multidentatus</i> . <i>L. Americanus</i> .
<i>L. transmarinus</i> .		
<i>L. mordax</i> .		
<i>L. paucidens</i>	=	<i>L. paucidens</i> .
<i>L. planus</i>	=	<i>L. planus</i> .

(Genus BOTHROPOLYS, Wood.)

<i>B. multidentatus</i>	=	<i>B. nobilis</i> .
<i>B. Xanti</i>	=	<i>B. Xanti</i> .
<i>B. bipunctatus</i>	=	<i>B. bipunctatus</i> .

Two years later or in 1867, we find mentioned also by Wood another species *L. bilabiatus*, from Illinois, "Notes on a collection of California Myriapoda, with the description of new eastern species," (Proced. Acad. Nat. Science of Philada. 1867, pp. 127-130.)

Finally, during the last years, the following species of Lithobii not previously known have been added to our knowledge of the myriapod fauna of North America:

(a.) Of Alois Furnbert and H. de Saussure, 1869, ("Myriapoda Nord Americana." Revue et Magasin de Zoologie, 2:me série, vol. XXI, pp. 149-159.) *L. aztecus*, *L. mystecus* and *L. toltecus*, all from Mexico.

(b.) Of Fr. Meinert, 1872, ("Myriapoda Musei trauniensis, II Lithobiini:" Nat. Tidsskrift, 3:R., 8:Bind, pp. 281-344) *L. vorax*, from Louisiana.

(c.) Of O. Harger, 1872, ("Descriptions of New N. American Myriopods:" Am. Journal of Sc. and Art, 3d series, vol. IV, pp. 117-121,) *L. pinctum*, from Oregon; and lastly

(d.) By the author of this paper, 1875 ("Nya N. Americanska Lithobier" —Ofvers. Kgl. Vet. Acad., Fish. aig 32 pp., 65-72). *L. monticola*, *L. pusio*, *L. paradoxus*, *L. obesus*, *L. kochii*, *L. megaloporus*, *L. eucnemis*, *L. saussurei* and *Lamyctes fulvicornis*.

Such is, in short, the historical development of our knowledge of the Lithobii of the N. American continent. Their number—very small, certainly, in comparison with what is known from Europe—does not exceed twenty-four, considering *L. spinipes*, Say, to be identical with *L. americanus*, Newport. The following is an abstract from a more extensive work, now in preparation, a preliminary report with synonymy of all hitherto known species.

Of the following species I know personally fourteen, or 2, 3, 5, 7, 8, 10, 13, 14, 16, 18, 19, 20, 21, 24. A very rich material, carefully collected and pre-

served, has been remitted to me by Gustaf Eisen, now in San Francisco; but besides I have also had the opportunity to receive valuable contributions from H. de Saussure in Geneva, and Fr. Meinert in Copenhagen.

Gen. I. LITHOBIUS Leach 1815. (Trans. Linn. Society, vol. XI, p. 381.)

Subgen. I. EULITHOBIUS Stuxberg 1875. (Ofvers Kgl. Vet.-Akad:ns Förhandl., årg. 32 N:o 3 pag. 8.)

Scula dorsualia, 6, 7, 9, 11, 13 *angulis porticis productis*.

Poricoxales in pedum paribus 12, 13, 14, 15.

1. EULITHOBIUS MULTIDENTATUS Newport 1845.

Syn. 1845. *Lithobius multidentatus* Newport, Trans. Linn. Society, vol. XIX, pag. 365.

1847. " " Gervais, Hist. Nat. d. Insectes Aptères, vol. IV, pag. 236.

1856. " " Newport, Catalogue of the Myriapoda, pag. 17.

1863. *Bothropolys nobilis* Wood, Journ. Acad. Nat. Sci. Philadelphia, new series, vol. V, pag. 15.

1865. " *multidentatus* Wood, Transact. Americ. Philos. Society, new series, vol. XIII, pag. 152.

Hab. in civitatibus orientalibus, ex. gr. Pennsylvania, Illinois, Missouri (sec. Wood).

Subgen. I. NEOLITHOBIUS Stuxberg 1875. (l. c., pag. 8.)

Scuta dorsualia, 7, 9, 11, 13 *angulis posticis productis*.

Pori coxales in pedum paribus, 12, 13, 14, 15.

2. NEOLITHOBIUS VORAX Meinert 1872.

Syn. 1872. *Lithobius vorax* Meinert, Naturhist. Tidsskrift, 3:dje Række 8:de Bind, pag. 292.

Hab. in Louisiana circa Beloxi haud procul ab New Orleans (sec. Meinert).

3. NEOLITHOBIUS MORDAX L. Koch 1862.

Syn. 1862. *Lithobius mordax* L. Koch, Die Myriapodengattung Lithobius, pag. 34.

1872. " " Meinert, Naturhist. Tidsskrift, 3:dje Række, 8:de Bind, pag. 294.

Hab. circa New Orleans (sec. Koch et Meinert).

4. NEOLITHOBIUS TRANSMARINUS L. Koch 1862.

Syn. 1862. *Lithobius transmarinus* L. Koch, Die Myriapodengattung Lithobius, pag. 33.

Hab. circa New Orleans (sec. Koch).

Subgen. III. LITHOBIUS [Leach] Stuxberg 1875. (Ofvers Kgl. Vet.-Akad:ns Förhandl., årg. 32 N:o 3, pag. 8.)

Scula dorsualia 9, 11, 13, *angulis posticis productis*.

Pori coxales in pedum paribus 12, 13, 14, 15.

5. *LITHOBIUS XANTI* Wood 1863.

- Syn. 1863. *Lithobius Xanti* Wood, Journ. Acad. Nat. Sci. Philadelphia, new series, vol. V, pag. 15.
 1872. " *rugosus* Meinert, Naturhist. Tidsskrift, 3:dje Række, 8:de Bind, pag. 306.
 Hab. in California, Oregon, cet.

6. *LITHOBIUS PLANUS* Newport 1845.

- Syn. 1845. *Lithobius planus* Newport, Transact. Linn. Society, vol. XIX, pag. 366.
 1847. " " Gervais, Hist. Nat. des Insectes Aptères, vol. IV, pag. 236.
 1856. " " Newport, Catalogue of the Myriapoda, pag. 18.
 1863. " " Wood, Journ. Acad. Nat. Sci. Philadelphia, new series, vol. V, pag. 14.
 1865. " " Wood, Transact. Americ. Philosophical Society, new series, vol. XIII, pag. 151.
 Hab.—?

7. *LITHOBIUS SAUSSUREI* Stuxberg 1875.

- Syn. 1875. *Lithobius Saussurei* Stuxberg, Ofvers Kgl. Vet.-Akad:ns Förhandl., årg. 32 N:o 2, pag. 71.
 Hab. in Mexico (H. de Saussure).

8. *LITHOBIUS FORFICATUS* Linné 1758.

- Syn. 1758. *Scolopendra forficata* Linné, Syst. Nat., ed. X, vol. I, pag. 638.
 1778. " " De Geer, Mém. p. servir à l'hist. des Insectes, vol. VII, pag. 557, tab. 25, figg. 1-6.
 1815. *Lithobius forficatus* Leach, Transact. Linn. Society, vol. XI, pag. —
 1815. " *vulgaris* Leach, Ibidem, pag. 382.
 1815. " *laevilabrum* Leach, Ibidem, pag. 382.
 1821. " *spinipes* Say, Journ. Acad. Nat. Sci. Philadelphia, vol. II, pag. 108.
 1842. " " Lucas, Hist. Nat. d. Crust., d. Arachn. et d. Myriapodes, pag. 543.
 1844. " *forficatus* C. Koch, Deutschl. Crust., Myriap. und Arachniden, Heft 40, tab. 20.
 1845. " *americanus* Newport, Trans. Linn. Society, vol. XIX, pag. 365, tab. XXXIII, fig. 29.
 1845. " *forficatus* Newport, Ibidem, pag. 367.
 1845. " *Leachii* Newport, Ibidem, pag. 368.
 1847. " *forficatus* Gervais, Hist. Nat. d. Insectes Aptères, vol. IV, pag. 229.
 1847. " *americanus* Gervais, Ibidem, pag. 236.
 1856. " " Newport, Catalogue of the Myriapoda, pag. 17.

- Syn. 1856. " *forficatus* Newport, Ibidem, pag. 18.
 1856. " *Leachii* Newport, Ibidem, pag. 19.
 1862. " *forficatus* L. Koch, Die Myriapodengattung *Lithobius*, pag. 39.
 1862. " *hortensis* L. Koch, Ibidem, pag. 45.
 1862. " *coriaceus* L. Koch, Ibidem, pag. 51.
 1863. " *forficatus* C. Koch, Die Myriapoden, Bd. I, pag. 113; tab. 52, fig. 104.
 1863. " *multidentatus* Wood, Journ. Acad. Nat. Sci. Philadelphia, new series, vol. V, pag. 13.
 1863. " *americanus* Wood, Ibidem, pag. 14.
 1865. " " Wood, Trans. Americ. Philos. Society, new series, vol. XIII, pag. 148.
 1866. " *forficatus* Palmberg, Sveriges Myriapoder Ordn. Chilopoda, pag. 15.
 1866. " *hortensis* Palmberg, Ibidem, pag. 17.
 1868. " *curtirostris* Eisen & Stuxberg, Ofvers. Kgl. Vet.-Akad. ms Förhandl., årg. 25, pag. 376.
 1869. " *forficatus* Meinert, Naturhist. Tidsskrift, 3:dje Række 8:de Bind, pag. 259.
 1869. " *coriaceus* Meinert, Ibidem, pag. 260.
 1869. " " v. Porath, Ofvers. Kongl. Vet.-Akad. ms Förhandl., årg. 26, pag. 637.
 1871. " *forficatus* Stuxberg, arg. 28, pag. 496.
 1872. " " Meinert, Naturhist. Tidsskrift, 3:dje Række, 8:de Bind, pag. 315.

Hab. in civitatibus orientalibus, ex. gr. New Foundland (J. Lindahl), New York (G. Eisen), Canada, Illinois, Missouri, Arkansas (sec. Wood).

9. *LITHOBIUS AZTECUS* Humb. and Saussure 1869.

- Syn. 1869. *Lithobius aztecus* Humb. and Saussure, Revue et Magazin de Zoologie, 2:me série, vol. XXI, pag. 156.
 Hab. in Mexico (sec. Saussure).

10. *LITHOBIUS MYSTECUS* Humb. and Saussure 1869.

- Syn. 1869. *Lithobius mystecus* Humb. and Saussure, Revue et Magazin de Zoologie, 2:me série, vol. XXI, pag. 156.
 Hab. in Mexico (sec. Saussure).

11. *LITHOBIUS PAUCIDENS* Wood 1863.

- Syn. 1863. *Lithobius paucidens* Wood, Journ. Acad. Nat. Sci. Philadelphia, new series, vol. V, pag. 14.
 1865. " " Wood, Transact. Americ. Philosoph. Society, new series, vol. XIII, pag. 151.
 Hab. in California circa Fort Tejon (sec. Wood).

12. *LITHOBIUS PINETORUM* Harger 1872.

- Syn. 1872. *Lithobius pinetorum* Harger, Americ. Journal of Science and Arts, 3:rd series, vol. IV, pag. 118.

Hab. in Oregon, "in the valley of the John Day River" (sec. Harger).
 Subgen. IV. *PSEUDOLITHOBIUS* Stuxberg 1875. (Ofvers. Kgl. Vet.-Akad:ns
 Förhandl., arg. 32, N:o 3, pag. 8.)

Scuta dorsualia 9, 11, 13, *angulis posticis productis*.

Pori coxales in pedum paribus 12, 13, 14, 15.

13. *PSEUDOLITHOBIUS MEGALOPORUS* Stuxberg 1875.

Syn. 1875. *Lithobius megaloporus* Stuxberg, Ofvers. Kongl. Vet.-Akad:ns
 Förhandl., arg. 32, N:o 2, pag. 69.

Hab. in California ad San Francisco (G. Eisen).

Subgen. V. *HEMILITHOBIUS* Stuxberg 1875. (Ofvers. Kgl. Vet. Akad:ns För-
 handl., arg. 32, N:o 3, pag. 8.)

Scuta dorsualia 11, 13, *angulis posticis productis*.

Pori coxales in pedum partibus 12, 13, 14, 15.

14. *HEMILITHOBIUS EUCNEMIS* Stuxberg 1875.

Syn. 1875. *Lithobius eucnemis* Stuxberg, Ofvers. Kgl. Vet.-Akad:ns Förhandl.,
 arg. 32, N:o 3, pag. 14.

Hab. in civitate New York ad Mount Lebanon (G. Eisen).

Subgen. VI. *ARCHILITHOBIUS* Stuxberg 1875. (Ofvers. Kgl. Vet.-Akad:ns
 Förhandl., arg. 32, N:o 3, pag. 8.)

Scuta dorsualia omnia angulis posticis rotundalus vel subrectis.

Pori coxales in pedum paribus 12, 13, 14, 15.

15. *ARCHILITHOBIUS BIPUNCTATUS* Wood 1863.

Syn. 1863. *Bothropolys bipunctatus* Wood, Journ. Acad. Nat. Sci. Philadel-
 phia, new series, vol. V, pag. 16.

1865. " " Wood, Transact. Americ. Philosoph. So-
 ciety, new series, vol. XIII, pag. 153.

Hab. in California cet. trans Rocky Mountains (sec. Wood).

16. *ARCHILITHOBIUS MONTICOLA* Stuxberg 1875.

Syn. 1875. *Lithobius monticola* Stuxberg, Ofvers. Kgl. Vet.-Akad:ns För-
 handl., arg. 32, N:o 3, pag. 14.

Hab. in Sierra Nevada (G. Eisen).

17. *ARCHILITHOBIUS TOLTECUS* Humb. and Saussure 1869.

Syn. 1869. *Lithobius Toltecus* Humb. and Saussure, Revue et Magasin de
 Zoologie, 2^{me} série, vol. XIX, pag. 157.

Hab. in Mexico (sec. Saussure).

18. *ARCHILITHOBIUS PUSIO* Stuxberg 1875.

Syn. 1875. *Lithobius pusio* Stuxberg, Ofvers. Kongl. Vet.-Akad:ns Förhandl.,
 arg. 32, N:o 3, pag. 16.

Hab. in California ad San Francisco (G. Eisen).

19. *ARCHILITHOBIUS KOCHII* Stuxberg 1875.

Syn. 1875. *Lithobius Kochii* Stuxberg, Ofvers. Kongl. Vet.-Akad:ns För-
 handl., arg. 32, N:o 3, pag. 18.

Hab. in California ad Sauzalito haud procul ab San Francisco (G. Eisen).

20. *ARCHILITHOBIUS OBESUS* Stuxberg 1875.

Syn. 1875. *Lithobius obesus* Stuxberg, Ofvers. Kongl. Vet.-Akad:ns Förhandl., arg. 32, No 2, pag. 67.

Hab. in California ad Sauzalito (G. Eisen).

21. *ARCHILITHOBIUS PARADOXUS* Stuxberg 1875.

Syn. 1875. *Lithobius paradoxus* Stuxberg, Ofvers. Kongl. Vet.-Akad:ns Förhandl., arg. 32, No 2, pag. 67.

Hab. in California circa urbem San Pedro (G. Eisen).

22. *ARCHILITHOBIUS BILABIATUS* Wood 1867.

Syn. 1867. *Lithobius bilabiatus* Wood, Proceed. Acad Nat. Sci. Philadelphia, 1867, pag. 130.

Hab. in Illinois (sec. Wood).

[Species incertæ sedis:]

23. *LITHOBIUS MEXICANUS* Perbosc 1839.

Syn. 1839. *Lithobius mexicanus* Perbosc, Revue Zoologique 1839, pag. 261.

Hab. in Mexico (sec. Perbosc).

Gen. II. *LAMYCTES* Meinert 1869. (Naturhist. Tidsskrift, 3:dje Række, 5:te Bind, pag. 266.)

24. *LAMYCTES FULVICORNIS* Meinert 1869.

Syn. 1869. *Lamyctes fulvicornis* Meinert, l. c. pag. 267.

1869. *Lithobius gracilis* v. Porath, Ofvers. Kongl. Vet.-Akad:ns Förhandl., arg. 26, pag. 641.

1871. *Lamyctes fulvicornis* Stuxberg, Ibidem, arg. 28, pag. 504.

1872. " " Meinert, Naturhist. Tidsskrift, 3:dje Række, 8:de Bind, pag. 343.

Hab. in civitate New York ad Mount Lebanon (G. Eisen).

Pacific Coast Lepidoptera, No. 20. Notes on the Case-Bearing Moths, (*Psychidæ*), with notices of Californian Species.

BY HENRY EDWARDS.

Among the whole of the insect races perhaps there are no more curious and interesting examples than are to be found in the family *Psychidæ*, the species of which, in the early stages of their growth, weave habitations for the caterpillars of fragments of stick, bark, lichens and other vegetable substances, carrying these singular structures about with them through the whole of their larval stage, and, in the case of the female, arriving at maturity, bringing forth her eggs, and eventually dying without once quitting her self-constructed prison. The *Psychidæ* are a portion of the great silk-spinning family of the *Bombycidæ*, but present many characters which are distinct in themselves, and entitle them to rank, as they are now by most entomologists allowed to do, as a separate and well-defined tribe.

Though containing comparatively few genera and species, they have a wide geographical distribution. Examples of the group are to be found in Europe, North and South America, West Indies, Mexico, Ceylon, Northern India, China, South Sea Islands, and Australia, being most abundant in the sub-tropical regions of the globe. Many of the species are, however, small in size, and it is possible that a very large number yet await the industry of observers.

In the construction of the caterpillar cases, they manifest wonderful ingenuity, and their houses are even more remarkable than those of the well-known caddis-flies among the *Neuroptera*. Pieces of bark, leaves, straws cut to a uniform length, twigs, mosses, lichens and grass, form, among the various species, the outer covering or decoration of the home, while the interior is lined with dense soft silk, the threads of which are also used to bind together the external fragments. Almost as soon as the larva is hatched from the egg, it begins the formation of its case, never quitting its habitation as it enlarges in size, but splitting it at the sides, weaving into the opening portions of the vegetable matter chosen and adding to the exterior larger pieces of stick, straw or leaves, as the case may be. "While the creature is small, and the house of no great weight, it is carried nearly upright, but when it attains size and consequent weight, it lies flat, and is dragged along in that attitude." The abdominal legs are furnished with a series of strong hooks, by which the larva retains so firm a hold of the interior of its tube that it is impossible to remove it without injury. When feeding, only the head and the first three or four segments are protruded, and if the caterpillar wishes to remain quiet, it fastens itself by strong silken threads to the branch on which it may chance to be; these threads, on a desire for removal, being bitten off close to the case.

It has the power of turning round inside of its case, and when full grown,

and about to change to the chrysalis state, it places its head downward, so that when the perfect insect is ready to emerge, it may do so from the posterior portion of the tube. And it may here be said that it is the male alone which escapes from its curious habitation. The female is, in most of the genera, totally unprovided with legs or wings, and is little more than a living bag of eggs, looking, as one author has said, "more like a grub than a moth, the head, thorax and abdomen being hardly distinguishable from each other." Her eggs are laid within the body of the tube, after which operation she dies, the first occupation of the young caterpillars being to consume the body of their mother, "a proceeding almost exceptional in the lepidopterous insects." Having done this, they leave their early home and go forth into the world to follow independent lives.

The males emerge from the chrysalis state in about three weeks, and are dull-looking moths of dark color, generally unattractive in appearance, having the antennæ in some cases deeply pectinated only at the base, and, in others, feathered throughout the whole length. They are remarkably swift in their flight, dashing themselves, in search of the females, wildly among the branches of the trees, and as their wings are delicate in structure, in many species nearly transparent, specimens in good order are very rare in collections.

The typical genus *Psyche* is mostly confined to the Old World, some forty species being there known to naturalists. The most striking examples of the group, however, in which the larva cases are sometimes four or five inches in length, belong to a genus named *Eceticus*, of which a species named *Eceticus Saundersii* is found abundantly in the West Indies, feeding upon fruit trees, and at times causing considerable damage. A closely allied form is common in Sinaloa, Mexico, some of the tubes of which, together with about sixteen species of *Psychida* from various portions of the globe, I have the opportunity of exhibiting this evening. I have, however, in my collection many of the cases, the perfect insects of which are unknown to me, and I may here mention that in confinement it is, from some cause or other, almost impossible to bring these creatures to maturity. During my residence in Australia, one species which, in its caterpillar state, was common upon the *Leptospermum lanigerum* (the tea-tree of the colonists), though persistently collected through several years and watched with incessant care, never reached the perfect stage, and to this day the imago is unknown to me. Nor was this due to the attacks of parasitic insects, as the substantial and somewhat formidable looking houses of the larva rendered them almost impervious to the onslaughts of ichneumons and other insect enemies. Death usually occurred after the caterpillar had undergone its change, the chrysalis gradually drying up after assuming its proper form, nor could any care and attention which I was able to bestow avert this misfortune.

Owing to the resemblance which exists between these remarkable insects and the fasces which were borne before the dignitaries of ancient Rome, one species has been termed the lictor-moth, while others are known as house-builders, sack-bearers, basket-carriers, and like appellations. According to the Rev. J. G. Wood, "the Singalese call them by a name which signifies billets of wood, believing that the insects were once human beings who stole

firewood while on earth, and are forced to undergo an appropriate punishment while in the insect state."

The species at present described as natives of the United States are very few, not more than five belonging to perhaps as many genera, being distinctly known to entomologists. The most common of these is a species called *Thyridopteryx ephemeriformis*, which, according to Dr. Harris, is occasionally abundant in Philadelphia and its vicinity, and there popularly known in its larval state as the drop-worm or basket-worm. It is at times very destructive to the arbor-vitæ, larch and hemlock trees. In California, though none as yet have been described, three species are known to me, two of which belong to the typical genus, *Psyche*; the third, and by far the most interesting, which has just been discovered by our President, Prof. Davidson, representing the genus *Eceticus*. It is, however, a matter of regret that at present the caterpillar cases of these three species are alone known, the perfect insects as yet evading our discovery.

Though, perhaps, not quite in order to give names to insects from their earlier stages alone, I am induced to offer brief descriptions of these curious creatures, and to suggest the names appended to them, in the hope that I may, by directing attention to the subject, induce observers in various portions of the State to devote their energies to the discovery, not only of the more mature conditions of the species, already imperfectly known to us, but to the detection of other forms of these most interesting insects.

Psyche fragmentella, n. sp. Hy. Edw.

Chrysalis case about an inch in length, tapering gradually to its posterior extremity, and composed externally of portions of leaves and bark, mostly ovate in shape, and from one to two lines in greatest diameter, in most cases laid flat on the silken web, and not overlapping each other. Chrysalis, pale, tawny, shining, smooth, of uniform thickness throughout.

Length, 0.40 inch.

On trunks of pine trees, Strawberry Valley, Siskiyou County. Hy. Edw.

Psyche coniferella, n. sp. Hy. Edw.

Chrysalis case a little over an inch in length, thickened anteriorly and composed of fragments of the leaves of pine, about three lines in length, laid in rows upon the silken web, and overlapping each other, in the manner of *P. graminella* and other European species. The fragments diminish in length on the posterior layers.

Grass Valley, Cal. On palings and trunks of pine trees. Hy. Edw.

Eceticus Davidsonii, n. sp. Hy. Edw. (See engraving.)

Chrysalis case about one and a half to one and three-fourths inches in length; stout, a little thickened in the middle, and composed of pieces of sticks or twigs from one-third to one and a quarter inches in length, laid side by side longitudinally, one or two pieces nearly always extending posteriorly some distance beyond the termination of the case. The fragments with which the case is covered are of different lengths, and are about fifteen in number, the interstices being filled with wood dust (most probably produced by the jaws of the insect itself), closely woven into the silken groundwork of

the case. The edges of the pieces of wood are always neatly rounded by the insect, and all outstanding branches are bitten off. Chrysalis, with the abdominal portions, light chestnut brown, with the wing cases almost black. It is nearly tubular in form, smooth, with some small hooks on the abdominal segments.

Length, 0.65 inch.

Discovered by Prof. Geo. Davidson on Mt. Diablo, on the branches of *Castanopsis chrysophylla*, Dougl., (chinquapin chestnut). I have much pleasure in recording this interesting discovery by attaching to the species the name of our respected President.

It will be observed, both in the present species and one closely allied to it from Australia, that there are, as I have shown, in most of the cases, some pieces of twigs longer posteriorly than those of which the remainder of the case is composed. It has struck me that these may be intended as a means to assist the male insect, on arriving at the perfect state, to escape from the body of the tube, the twig affording foothold and enabling the creature to draw its somewhat unusually long abdomen from the aperture. I do not state this as a fact, but the subject is worth the observation of those who may be fortunate enough to have the opportunity. I suspect that the cases containing males only have these lengthened sticks, but if this be so we are utterly at a loss to understand the process by which the creature arrives during the caterpillar stage at a knowledge of its sex, and so frames its habitation accordingly.

REGULAR MEETING, DECEMBER 1, 1876.

President in the Chair.

Donations to the Museum: From S. B. Christy, specimen of *Molybdenum* from Red Jacket Mine.

Professor Davidson read a continuation of his papers on Irrigation, describing the North Sea Canal of Holland.

Pacific Coast Lepidoptera, No. 21.—Descriptions of two new species of the Genus *Thecla*.

BY HENRY EDWARDS.

Thecla Putnami. n. sp. Hy. Edw.

♀. Upper side. Pale fawn color, shading into dark drab or stone color at the base and costal margin. Fringes entirely white. Secondaries with a series of four indistinct lunulate spots, black, edged beneath with white; anal

spot faintly tinged with golden yellow. Tails black, edged with white, and the apices also broadly white. Thorax and abdomen slate color. Antennæ dull slate, annulated with white.

Under side. Entirely grayish white. Primaries with black discal lunule and six submedian ovate black spots, each with a white ring. Near the posterior angle are four very faint black streaks, the under side of the primaries of this species bearing a close resemblance to that of many *Lycenas*, particularly that of *Ly. Pheres*. Bdv. Secondaries with black discal lunule and seven submedian spots as in the primaries, except that the one nearest to the abdominal margin is lunulate. The marginal markings peculiar to the genus are very faintly produced; the anal spot is a blackish, cloud-edged above with orange; the second and third are blackish, with a few blue scales intermingled, visible only with a lens; the fourth black, surmounted by pale orange, and the remainder black lunules, becoming faint as they pass the median nerve.

Exp. of wings, 1.25 inch.

1 ♀ (Coll. Hy. Edw.) Mt. Nebo, Utah, July, 1875. Taken by my friend, Mr. J. D. Putnam, of Davenport, Iowa, to whom I have great pleasure in dedicating the species. I should have hesitated to describe this insect from a single specimen, but its very decided character leaves me no room to doubt that it is a new species. In this opinion I am confirmed by Mr. S. H. Scudder, to whom I submitted this and the following species, and who has included both in his "Synonymic List of American Rurales, 1876." A second specimen of *T. Putnami*, which in its general character most resembles *T. Dryope*, Edw., was taken in Colorado, in July of the present year, by Baron von Osten Sacken.

Thecla Adenostomatis. n. sp. Hy. Edw.

♂. Dull slate brown on the entire upper surface, with a slight golden reflection when viewed obliquely. Fringes concolorous. Antennæ black, with white annulations; club, with its extreme tip orange above, entirely orange beneath. Eyes surrounded at their base by white hairs. Thorax and abdomen concolorous. Secondaries with anal angle slightly produced posteriorly, with a black streak at the base of the fringe, and above a very few blue scales. Tails short, black, with extreme tip white.

Under side of primaries slate drab, with very faint greenish tinge. Discal spot obsolete; a waved submedian unbroken line, white, edged anteriorly with dark slate; and six very faint submarginal patches of black. Secondaries, dark slate color at the base, from which along the abdominal margin are numerous white scales, giving a mottled appearance. Submedian band white, edged above with black, especially about the middle. Anal spot mottled with black and white; other markings a series of five or six lunules, black, edged above with whitish. All of these spots, when viewed with a lens, have a very faint trace of fulvous.

Exp. of wings, 1.15 inch.

♀. Similar to the ♂, except that the fringes are more decidedly white, the anal mark with a bluer tinge above, and the tail slightly longer than in the

other sex. The club of the antennæ is also wholly black, except the extreme tip, which is orange.

Exp. of wings, 1.25 inch.

25 4 ♂. Tehachepi Pass, Southern California. Taken by Mr. R. H. Stretch, July, 1875. Closely allied to *T. Tetra*, Behr, but differing from that species by the apparently utter absence of fulvous, which is only distinguishable by a powerful lens. It is also slightly a larger insect than *T. Tetra*, and the wings are all more angularly produced than in that species. It is, however, sufficiently near to be confounded with it, and probably may be found in other localities in California.

Remarks on the Crustacea of the West Coast of North America, with a Catalogue of the Species in the Museum of the California Academy of Sciences.

BY W. N. LOCKINGTON.

GRAPSOIDEA, OR OCYPODIDÆ.

OCYPODIDÆ.

Ocypoda Gaudichaudii? Edwds. & Luc. D'Orbigny's Voy. in Am. Merid. Crust., p. 26, pl. XI, fig. 4.

As I have not seen Edwards' description of this species, I subjoin a short description:

Carapax slightly wider across the centre than in front. Lateral angles of anterior margin very prominent, upper orbital border sinuate; front narrow, eyes large. Right cheliped much larger than the left in both sexes; arm trigonal, with its inferior surface somewhat concave, in consequence of both its margins being slightly raised and beset with spinous tubercles; the upper margin rounded, rugose with rows of small tubercles. Carpus short and stout, with a sharp spine on its anterior border at distal end, and rows of small tubercles above, becoming more prominent and somewhat spinose distally. Manus broad and thin, covered with tubercles exteriorly; a row of saw-like spines along the lower margin continued along the propodal finger, which is cristate, hooked at end, and with several teeth internally. Movable finger similar to fixed, spinose along its upper margin.

Ambulatory limbs flattened; merus with a sort of roll on its upper margin, crossed by tubercular rugæ. Carpi of second, third and fourth pairs setose at distal lower extremity; propodi of the same three pairs setose below; carpus and propodus of fifth pair without hairs; all the dactyli fringed in front with setæ. Third joint of outer maxillipeds narrower, and about half the length of the second joint.

First two segments of male abdomen very short; third and fourth longer, fifth still longer, sixth longest. Fifth segment narrowest; sixth convex on both sides; seventh a small truncate triangle. Fourth and fifth segments of

female abdomen widest; sixth a semi-ellipse, with the small seventh segment inserted in a concavity of the anterior margin.

	♂	♀
	M. M.	M. M.
Greatest length of carapax	45	32
Greatest width of carapax	53	37.5
Length of right manus	48	28
Width of right manus	28	15

Several specimens from Magdalena Bay, West Coast Lower California; La Paz, Lower California; and Boca de las Piedras, Sinaloa, Gulf of California.

O. Gaudichaudii was found at Panama by Mr. Sternbergh (Stimpson, Notes on North Amer. Crust., p. 15); and also in the Gulf of Fonseca, Central America, by J. A. McNeil (S. T. Smith, Peabody Acad. Sci., 1869, p. 91).

No. 43. Male and female. Gulf of California. W. J. Fisher.

Genus *Gelasimus*.

Six species of this genus are included in the collection of Mr. W. J. Fisher. One only of these belongs to the section having a narrow front, with the bases of the ocular peduncles close together. This is the *G. princeps* of S. T. Smith.

Another species, having the fourth, fifth and sixth abdominal segments united, is certainly the *G. gibbosus* of the same author. Another I believe to be the *G. brevifrons* of Stimpson.

None of the remaining kinds answer to Stimpson's and Smith's description of *G. panamensis*, so that unless two of them are referable to the Chilean species, *G. macrodactylus* and *G. stenodactylus*, it is fair to suppose they are new species. I have described two of them as new, and the remaining one, with some misgiving, I provisionally refer to *G. stenodactylus*.

Gelasimus princeps. S. T. Smith. Trans. Conn. Acad., 11, 120, plate 11, fig. 10; pl. 111, f. 3-3c.

This species is found in holes under rocks at low tide. The female, as noticed by S. T. Smith, differs considerably from the male, having the carapax less narrowed behind, with granules thickly scattered over the dorsal regions.

Two large specimens measure:

	♂	♀
	Inch.	Inch.
Extreme width of carapax	1.65	1.37
Extreme length of carapax	1.03	.35
Length of large hand	3.00	
Width of large hand	0.95	

Localities—Magdalena and San Bartolomé Bays, West Coast Lower California. W. J. Fisher. Corinto, Nicaragua. J. A. McNeil.

No. 51. Male and female. Magdalena Bay, in spirits. Fisher and Lockington.

G. heterophthalmus. S. T. Smith, *loc. cit.*, 116, pl. 11, f. 6; pl. 111, f. 1-16. Gulf of Fonseca, West Coast Central America.

G. heteropleurus. S. I. Smith, *loc. cit.*, p. 118, pl. 11, f. 7; pl. 111, f. 2-26. Gulf of Fonseca, W. C. Cent. Amer.

G. armatus. S. T. Smith, *loc. cit.*, p. 123, pl. 11, f. 5; pl. 111, f. 4-4d. Gulf of Fonseca.

G. ornatus. S. T. Smith, *loc. cit.*, 125, pl. 11, f. 9-9a; pl. 111, f. 5-5c. W. C. Cent. Amer.

G. brevifrons. Stimpson. Ann. Lyc. Nat. Hist., New York, vol. vii., p. 229. S. T. Smith, *loc. cit.*, 131.

I have not seen Stimpson's description of this species, but from Smith's comparison of its carapax with that of *G. minax*, I conclude that several specimens collected by Mr. Fisher on the West Coast of Lower California, belong to this species. The meros of the larger cheliped is stout, triquetral, and marked on its exterior surface with transverse setose striæ; the carpus has a rounded tooth at its inferior distal end, and the manus is large and heavy, twice as large as the width of the carapax, the palmar portion rounded and smooth, but minutely granular on the outside, and on the inside beset with small tubercles on its more elevated portions. The depression for the carpus is short but very deep, the thin upper edge of manus curving inwards over it. The propodal finger is slightly deflected downwards, and the dactylus curved from the base, the curve increasing towards the tip. The tubercles of the inner edges of the fingers are very indistinct, except one near the centre of the propodal finger, and another close to the tip, which thus appears bifid.

In the smaller cheliped the tips of the fingers are obtuse and rounded, and the outer edges raised, so that they are imperfectly spoon-shaped. The dactylus and propodal finger are almost parallel and near each other, but touch only at the tip, where they have a few setæ.

The meral segments of the ambulatory legs are plicate, like those of the chelipeds.

Following are the dimensions of two large specimens:

	♂	♀
	M. M.	M. M.
Length of carapax	17	13
Width of carapax	23	19
Length of larger hand	45	

The fourth, fifth, and sixth segments of the abdomen in the male are not united.

The carapax in this species is considerably narrowed posteriorly, is much less convex than usual in the genus, and of an olive color. The chelipeds of the female closely resemble the smaller cheliped of the male.

No. 85. Male and female. Magdalena Bay, in spirits. Fisher and Lockington.

Gelasimus stenodactylus? Edwds. & Lucas, Voy. dans L'Amer. Mer. Crust., 26 pl. 11, f. 2. M. Edwds. Ann. des Sci. Nat., 3d serie. Zoöl., tome xviii., p. 149. S. T. Smith, *loc. cit.*, 139.

I have not seen the description of this species by Edwds. and Lucas, and therefore question its identity with a single male specimen of a *Gelasimus* with very short fingers that was brought from the West Coast of Lower California by Mr. Fisher.

The fingers of the larger cheliped are very short, the dactylus does not attain the length of the inferior margin of the palm, and the propodal finger is much shorter.

The manus of the smaller cheliped resembles that of *G. gibbosus*. The carapax is highly convex, the anterior lateral angles almost in a line with the front, so that the orbital border is but slightly sinuous; the inferior orbital border dentate, and the lateral margins converging.

	M. M.
Length of carapax.....	7
Breadth of carapax.....	13
Length of larger hand	14

Gelasimus rectilatus, nov. sp.?

Among the *Gelasimi* collected by Mr. Fisher on the West Coast of Lower California are two specimens which I cannot refer to either of the broad-fronted species from this coast, described by S. I. Smith and Stimpson, viz: *G. gibbosus*, *G. panamensis* and *G. brevifrons*. As I have not seen the descriptions of *G. macrodactylus* and *G. stenodactylus*, it may possibly be one of these, though neither name seems applicable.

I append a short description:

Front narrower than usual in the broad-fronted section of this genus, not much more than half the width of the buccal frame; carapax tapering posteriorly, the sides forming an almost straight line from the antero-lateral angles to the straight posterior margin; antero-lateral angles much posterior to the line of the front, acute and with considerable lateral projection. Upper orbital border highly sinuous entire, lower orbital border toothed at its outer angle. Outer maxillipeds greatly gibbous, the buccal area separated from the jugal by a distinct depression. Larger cheliped smooth (microscopically granulated), except on inner surface of manus, where there is a line of small tubercles on the inner edge of the propodal finger, and a second on the ridge proceeding upwards from the lower edge of that finger. Fingers tubercular on their inner edges, the largest tubercles that in the centre of the length of each, and that near the tip of propodal finger. Fingers of smaller cheliped parallel, equal, imperfectly spoon-shaped.

Hands of female similar to the smaller cheliped of male. Ambulatory feet

entirely smooth, with a few hairs. Abdomen of male with all the joints distinct, gradually narrowing from the base.

	♂ M. M.	♀ M. M.
Length of carapax	9	8.5
Width of carapax.....	14	13
Length of larger hand.....	19	

The larger hand greatly resembles that of the species I have referred to *G. brevifrons*, but the fingers are proportionally shorter, a character which may, however, be due to immaturity. The great differences between this form and *G. brevifrons* are the entire want of the meral plications, and the form of the lateral margins of the carapax, which in the latter continue nearly perpendicular to the front for some distance before they commence to converge.

A single pair is all I have seen of this form. The great convexity of the carapax, and the absence of any coarse granules on the front and anterior part of the branchial regions, distinguish it from *G. panamensis*.

Gelasimus crenulatus. nov. sp.

Carapax highly convex, transverse, antero-lateral angles acute and prominent, slightly posterior to the front; superior orbital margin sinuous, inferior crenulated, the teeth equal in size and with a straight upper edge.

Dorsal surface smooth and shining; median and lateral gastric regions clearly marked off; cardiac distinct; branchial regions prominent, tumid, each divided in two by an indistinct sulcus, parallel with the lateral margins of the carapax.

A broad ridge on the inner edge of the fourth joint of outer maxillipeds, continued downwards along the greater portion of the inner edge of the third joint. Merus of greater cheliped stout, triquetral, marked with numerous short, transverse, not prominent rugæ. Carpus and manus smooth and unarmed, except a few small tubercles on the raised line anterior to the depression for the carpus on the inside of the manus. Propodal finger long and slender, pointed at tip, and with a tubercle in the centre of its length. Dactylus longer than propodal finger, curved, the tip of the curve considerably overpassing that of the latter. Merus of smaller hand slender, triquetral, smooth, carpus smooth, about equal in length to the palm of the manus; fingers equal, parallel, near together, touching at tips, which are pointed.

Hands of female like those of smaller male cheliped. Ambulatory feet smooth and shining, with a few long setæ on the propodi, and more numerous and shorter setæ on the dactyli.

The hand of this species is similar to that of *G. brevifrons*; the gibbous carapax, with its areolations, resembles closely *G. gibbosus*, but the third, fourth and fifth segments of the abdomen are free, instead of anchylosed, as in that species; and the margins of the carapax again resemble those of the species I have referred to *G. brevifrons*, but the convexity of the surface, with the tumid branchial regions, give it a very different appearance.

Unless this is the *G. macrodactylus* of M. Edwards, found on the coast of Chili, it is certainly a new species.

No. 49. Todos Santos Bay, near San Diego, dried. Hy. Hemphill.

No. 50. " " " " " in spirits. Hy. Hemphill.

Gelasimus gibbosus. S. I. Smith. Trans. Conn. Acad., March, 1870, 140; plate 11, f. 11; pl. iv., f. 8.

Numerous specimens from the West Coast of Lower California, principally from San Bartolomé Bay, agree with Smith's description and figure of this species in every particular, except in having the front more suddenly curved forwards. The sub-hepatic regions are thickly setose.

The fingers of the smaller cheliped are equal in length, and twice as long as the broad, stout, and short palmar portion of the manus; they are widely separated at their base, gape throughout their length, and are curved to meet each other at their extremities, which are of a yellowish brown tint. There are a few scattered hairs on the fingers. In the female both chelipeds are exactly like the smaller cheliped of the male.

The depression between the buccal and sub-hepatic (jugal) areas is very distinct; the teeth of the inferior margin of the orbit increase in size and slenderness on the outer portion; and the fourth, fifth and sixth abdominal segments are anchylosed. The prevailing tint of the carapax and limbs (in spirits) is blue, of varying intensity, shading in parts into greenish and into white on the fingers of the chelipeds. Many very small specimens have the fingers of the larger cheliped but little developed, not exceeding the palm in length, and closely approximated to each other.

At first I thought these to be a distinct variety, but now believe them to be the young of the same species, as they agree in every other particular, and some show evidences of a change in the relative proportions of the palm and dactyli as growth progresses.

No. 86. Male and female, in spirits. Bartolomé Bay. Fisher and Lockington.

GECARCINIDÆ.

Cardiosoma crassum.? S. I. Smith, *loc. cit.*, 144; pl. v., f. 5. Gulf of Fonseca, W. C. Cent. Amer. La Paz, Lower California.

A single fine male specimen from the latter locality agrees in most particulars with the figure and description referred to, but the carina of the lateral margin is much less distinct and high; and the larger hand differs in form.

As the specimen exceeds in size any of those measured by Mr. Smith, I think it possible that the differences referred to may be owing to the greater age of the individual; but as it may possibly prove to be a different species, I append a description of the chelipeds.

Merus and carpus as in *C. crassum*; larger hand short and broad, the depth exceeding the length of the superior margin. Propodal finger slender and straight, slightly spoon-shaped at extremity, with a large tooth near the

centre of its length, and several smaller teeth. Distal end of manus forming an angle of about 80° with the superior margin, and of about 60° with the propodal finger, which does not increase greatly in width towards its base. Dactylus slender with a large tooth nearer the base than the tip, which is inflated and spoon-shaped. Inner surface of the hand, towards the margins, armed with scattered tubercles of small size. Upper portion of manus curving inwards posteriorly, the carpus fitting, when the hand is bent, into the hollow between the upper incurved carina and lower thick portion of the manus. The smaller hand is similar to the larger. The stoutness of body of this crustacean is such that the sides of the branchial and hepatic regions are visible from above, and protrude laterally beyond the antero-lateral carina. The male appendages agree with those of *C. crassum*.

	M. M.
Greatest length of carapax, measured along its convexity....	100
Greatest width of carapax.....	101
Length of larger hand to end of propodal finger.....	127
Length of larger hand from carpus to base of dactylus.....	40
Greatest width of larger hand.....	58
Width of carapax between antero-lateral carinæ in front.....	93

If this should prove, on examination of more specimens, to be a new species, I propose to name it *Cardiosoma latimanus*.

Gecarcinus quadratus. De Saussure. *Revue et Mag. de Zoöl.*, v., 360; pl. xii., f. 2.

The work above referred to is not accessible to me. In Mr. S. I. Smith's Notes on American Crustacea, Trans. Conn. Acad., vol. ii., *Cardiosoma quadratum*, Saussure, is referred to. Are they identical?

The male appendages of *C. quadratum* figured in the plate iv. of the notes cited above differ from those of the *Cardiosoma* described under *C. crassum*, Mazatlan.

BOSCIADÆ.

Potamocarcinus armatus. M. Edwards. *Archiv. du Mus.*, vii., 174; pl. xiii. Obtained in the North Pacific Exploring Expedition in Lake Nicaragua. Stimpson. *Prod. des Animal. evert*, p. 46.

GRAPSIDÆ.

15. *Grapsus strigatus*. Latreille. Stimpson, *Crust. & Echi.*, P. S. N. A., says: "Specimens in the Brit. Mus. from Lower California are referred to this species by White." White, *Brit. Mus. Cat. Crust.*, p. 40.

Numerous specimens of a *Grapsus* from Lower California agree in every respect with the remarks upon this species in Dana's *Crust. U. S. Ex. Exp.*, vol. 1, p. 338; having the merus of the right posterior legs three-toothed at its distal end, instead of entire, as in *G. pictus*.

No. 52. Mazatlan, dried. Henry Edwards.

No. 53. Locality unknown, dried. Donor unknown.

16. *Grapsus pictus*. De Saussure; Revue et Mag. de Zool., V., 362; Stimpson, Crust. & Echi., P. S. N. A., 26.

Stimpson doubts the identity of De Saussure's *G. pictus* with that of Latreille. I have as yet, among abundant specimens of crustacea from the east and west coast of Lower California, received but one species of *Grapsus*, and this does not agree, either in coloration or in the merus of the posterior legs, with the *G. pictus* described by Dana, Crust. U. S. Ex. Exp., 1, 337.

16. *Pseudograpsus*, } *Oregonensis*. Dana, U. S. Ex. Exp., Crust., 1, 334, pl. *Heterograpsus*, } XX, f. 6; Milne Edwards, Melanges Carcinologiques, 157; Stimpson, Proc. Cal. Sci., 1, 38.

No. 54. Three males, dried, S. F. Bay. Lockington.

No. 55. Several specimens, S. F. Bay. *Ibid*.

17. *Pseudograpsus*, } *Nudus*. Dana, U. S. Ex. Exp., Crust., 1, 335, pl. XX, *Heterograpsus*, } fig. 7; Milne Edwards, *loc. cit.*, p. 159; Stimpson, *loc. cit.*, 1, 38.

No. 56. Several specimens, S. F. Bay. Lockington.

No. 57. Several specimens, Black Point, S. F. Bay. Lockington.

18. *Goniograpsus pulcher*. nov. sp.

Carapax with numerous transverse lines, not extending to the central regions. Sulcus between gastric and cardiac regions, very distinct. One antero-lateral tooth behind the post-orbital. Sides convergent posteriorly. Perpendicular portion of front about four times as long as high. Outer antennæ exsert. Outer maxillipeds widely separated, narrow. Chelipeds subequal, merus triquetal, with the upper margin rounded, lower anterior ditto, produced into a wing-like keel, armed with about nine teeth on its edge; posterior margin toothed. Two or three teeth on the anterior edge of the ischium. Carpus with three teeth on its upper anterior angle. Manus broad and thin, smooth exteriorly, tubercular interiorly. Dactylus tubercular above. Upper surfaces of the merus crossed by transverse raised lines similar to those of the carapax. Carpus crossed, also, by rugæ, which show a tendency to split up into tubercles. Tubercles of manus arranged in longitudinal rows along its upper margin. Ambulatory legs, with the distal end of merus three-toothed, the upper tooth sharp, the two others long and rounded lobes; terminal joints with scattered hairs; dactyli spinose. Abdomen of the male with the two first joints very short, the third joint widest, and with strongly convex sides; remaining joints regularly diminishing in width, with a slight convexity. Color citrine, with a variable reticulation of dark brown, the ground becoming yellowish upon the legs. Chelipeds bright red.

Several specimens of both sexes from Magdalena Bay, west coast, Lower California.

The measurements of two average-sized specimens are as follows:

	♂	♀
Greatest length of carapax.....	40	30
Greatest width of ditto.....	43	34

The branchial regions are much elevated in old specimens.

I have preferred to employ Dana's name of *Goniograpsus* in preference to Randall's *Pachygrapsus*, as the generic characters given by the former author are the more precise and definite.

This species appears to be very near to the *Goniopsis cruentatus* of De Haan, but that species has the hand, carpus, and dactylus small spinulose above.

No. 58. Magdalena Bay, in spirits. W. J. Fisher.

19. *Pachygrapsus* (*Goniograpsus*) *crassipes*. Randall, Jour. Acad. Nat. Sci., Phil., VIII, 137; Stimpson, Crust. & Echi., P. S. N. A., 27.

No. 59. Several specimens, S. F. Bay. W. N. Lockington.

20. *Goniograpsus* (*Pachygrapsus*) *transversus*. Gibbes, Amer. Asso. Adv. Sci., 1850, p. 181; Stimpson, Ann. Lyc. Nat. Hist., N. Y., vol. VII, p. 64; S. I. Smith, Rep. Peabody Acad. Sci., 1869, p. 91.

The last named writer mentions specimens from Havana, the Gulf of Fonseca, and other points of the Pacific coast.

I have not seen either the species or a description of it, and therefore cannot be certain that the species just described may not be identical with it; but if so, the name *transversus* is very inapplicable.

21. *Glyptograpsus impressus*. S. I. Smith, Trans. Conn. Acad., vol. II, p. 154. Acajutla, west coast, Central America.

32. *Goniopsis cruentatus*. De Haven; S. I. Smith, Rep. Peabody Acad. Sci., 1869, 91.

23. *Sesarma sulcata*. S. I. Smith, Trans. Conn. Acad., loc. cit. p. 156. Corinto, W. coast Nicaragua.

24. *Sesarma occidentalis*. S. I. Smith, loc. cit. p. 158. Acajutla, W. coast Central America.

25. *Sesarma augusta*. S. I. Smith, loc. cit. p. 159. Pearl Islands, Bay of Panama.

26. *Aratus Pisoni*? M. Edwds, Ann. Sci. Nat. 3d ser., 1853, tome XX, p. 187. Hist. Nat. des Crust. II, p. 76, pl. 19, f. 45.

"A specimen from Corinto, Nicaragua, appears to belong to this species, but it has not been carefully compared with east coast specimens." S. I. Smith, Rep. Peabody Acad. Sci., 1869, p. 92.

GONOPLACIDÆ.

27. *Prionoplax ciliatus*. S. I. Smith. Panama.

Prionoplax spinicarpus. M. Edwds., Ann. des Sci. Nat., 3d series, XVIII, 161. *Ibid.* Archives du Mus. d'Hist. Nat., VII, 167, Pl. VI, f. 3. Stimpson, Notes on N. Amer. Crust., 13.

28. *Euryplax politus*. S. I. Smith.
Panama.

29. *Glyptoplax pugnax*. S. I. Smith.
Panama.

30. *Eucrate Californiensis*. Lockington, Proc. Cal. Acad. Sci., Feb. 7, 1876. No. 61. San Diego, (Hy. Hemphill), dried.

This species is certainly neither of the preceding, but appears to closely resemble Stimpson's *Speocarcinus Carolinensis*.

PINNOTHERIDÆ.

31. *Pinnotheres faba*. Dana, U. S. Ex. Exp., I, 381, pl. 24, fig. 4. *Pinniza faba*. Stimpson, Crust. and Echi., P. S. N. A., p. 30.

Found in the large Lutraria of the Oregon coast.

32. *Pinnotheres margarita*. S. I. Smith, Trans. Com. Acad., Vol. II, p. 166, Verrill, Amer. Nat., III, 245.

Two females of this species was brought by Mr. W. J. Fisher from Malege Bay, Gulf of California.

"Everywhere covered, except the dactylus of the right ambulatory leg of the second pair in the female, and tips of the others in both sexes with a very short and close, clay-colored pubescence, much like a uniform coating of mud."

Found in the pearl oyster, *Margaritophora fimbriata*.

A new species of *Pontonia* (*P. margarita*, Lockington,) is mentioned by Mr. Fisher as having been taken from *Margaritana margaritifera*, at Port Escondido, Gulf of California, but as Mr. Fisher's collections were almost exclusively marine, it is not unlikely that the above mentioned mollusk was the one he meant to indicate.

33. *Pinnotheres lithodomi*. S. I. Smith, Trans. Conn. Acad., loc. cit.
From *Lithodomus aristatus*, Pearl Islands, Panama.

34. *Pinnotheres angelica*. nov. sp.

Carapax smooth and shining, soft and slippery, without sutures, (when undried) somewhat transverse. External maxillipeds widely divaricate posteriorly; the third joint shaped like a boomerang, the external convex margin more curved than the concave internal margin; distal extremity rounded and ciliate on its internal edge, terminal joints ciliate. Chelipeds smooth, cylindrical, save that the manus is somewhat compressed distally; dactylus short, about half as long as the posterior part of the propodus, and equal in length to the propodal finger; both fingers hooked at the end, without teeth on their

internal borders. Ambulatory legs slender, cylindrical, smooth, dactylus of first pair short, that of second pair about as long as the propodus; those of third and fourth pairs equal in size, rather larger than that of first pair and about half as long as the propodi; that of fourth pair ciliate on its internal margin. Abdomen very large, wider than the carapax and covering the maxillipeds and even the eyes, when folded.

Several specimens, all females, were collected at Angeles Bay, Gulf of California, September, 1876, "in oysters."

	♂	♀
	M. M.	M. M.
Length of carapax.....	11.5	9
Width of carapax.....	15	12
Breadth of abdomen.....	16.5	13.5

Many of the specimens are loaded with ova.

35. *Fabia subquadrata*. Dana, U. S. Ex. Exp., I, 882, pl. 24, fig 5. Stimpson, Crust. & Echi. P. S. N. A., 30.

Puget Sound. Farallone Islands.

- No. 83. In spirits, from mantle of *Pachydesma crassitelloides*. San Diego, (Hy. Hemphill.)

36. *Dissodactylus nitidus*. S. I. Smith, Trans. Conn. Acad. Sci., 1869, 173. Panama. Gulf of California. (Fisher.)

Two females from the latter locality have the peculiar bifurcate dactyli, from which Mr. S. I. Smith has named the genus *Dissodactylus*, and probably belong to *D. nitidus*, of which that author describes the male. The carapax is firm, somewhat wider at the lateral angles than posteriorly; convex in front and at the margins, without any upturned border along the antero-lateral margin, but with a short fissure extending obliquely inwards immediately anterior to the lateral angle. The posterior margin has an upturned border. There is no pubescent tuft on the inferior edge of the propodal finger. The ambulatory legs are as in the male. The abdomen resembles that of *Pinnotheres*, the terminal article reaching and partly covering the buccal frame. The prevailing color is dark purplish brown, with spots of white upon the carapax, and a ring of white at each joint of the limbs. The dactyli are white.

37. *Pinnixa ? nitida*. nov. sp.

Male. Carapax exceedingly transverse, smooth, shining, color in spirits, bright orange; all the limbs smooth and shining, without pubescence, of a straw yellow color. Maxillipeds very small and triangular, closely fitted to the buccal area, smooth and shining, as is also the sternum. Abdomen narrow at base, second segment rapidly widening, third widest, fourth, fifth and sixth tapering rapidly, seventh almost as long as wide, triangular, with the apex rounded. The abdomen does not cover more than one-half the sternal area. Chelipeds shorter than either second or third pair, the manus broad, with two setose ridges on its anterior surface, fingers short, hooked, toothless, movable finger oblique. Three last joints of ambulatory limbs flattened, carpus broad at distal extremity, scarcely longer than wide; propodus nearly twice as long as wide; dactylus slender, cylindrical, white, ending in a sharp yellow claw. Margins of last three joints setose, second pair (first ambulatory pair)

longer than the third, which are themselves longer than the chelipeds, fourth pair shorter, fifth very short.

	M. M.
Width of carapax	11
Length of carapax	5

Female. Carapax broadly transverse, smooth, shining, margins curved, angles rounded. Outer maxillipeds much larger than in the male just described, parallel, tomentose. Chelipeds shorter than fourth pair, hand short and rounded, wider than thick, tomentose, propodal finger short, hooked, dactylus oblique, hooked, toothless. Merus, carpus and propodus of all the ambulatory limbs greatly compressed; propodus as long as wide; carpus nearly twice as long as wide; dactylus short, cylindrical, ending in a sharp claw. Abdomen broad, covering the whole sternum, and fringed with long hairs round its margin. The pubescence of the chelipeds is continued along the fingers nearly to their tips, and is found also on the external portions of the carpus and flattened joints of the ambulatory limbs, as well as on the hepatic region. The color, where free from pubescence, is a brownish yellow (in spirits).

	M. M.
Length of carapax	7.5
Width of carapax	14

A single specimen of each the two crustaceans just described was collected on the same day at the same locality, namely, Angeles Bay, Gulf of California, and the two were placed by the collector (Mr. W. J. Fisher) in the same phial. Had it not been for this, I should certainly have never linked together two specimens so distinct in the relative proportions of the limbs themselves, as well as of the joints of those limbs; one covered in many places with an abundant pubescence, the other smooth and shining above and below. The proportions of the ambulatory limbs in the female agree with the genus *Pinnixa*, but in the male the increase of size is transferred to the second pair. Should these crustacea prove to be distinct the female should be *Pinnixa tomentosa*, while the male must be placed in some other genus.

I have no means of ascertaining upon what species of invertebrate animal these crustacea resided as commensals.

38. *Pinnixa longipes*. (*Tubicola longipes*. Lockington, Proc. Cal. Acad. Sci., April 17, 1876.)

This species should properly be placed in the genus *Pinnixa*. It possesses the characters of transverse carapax, and elongated fourth pair, in an extraordinary degree.

No. 60. Tomales Bay. (Lockington.) in spirits.

When I wrote the description of this species, I was not aware that any species of Pinnothera had previously been found quartered upon a worm, but I have since found that Stimpson (Notes on N. Amer. Crust., 21, 23) mentions two species, both belonging to this genus, that live in similar localities.

These species are, *P. cylindrica*, which inhabits the tube of the *Chaetopterus*, of South Carolina, and *P. laevigata*, which lives with the lobworm, *Arenicola cristata*, in its hole, not lined by any tube, in the sand.

A New and Expeditious Method of Placing the Transit.

BY T. J. LOWRY.

The most approved methods of finding latitude and time are those with the telescope in the plane of the meridian; and hence this plane is the first object of the practical astronomer's search in the observatory. The methods now understood by the astronomer of getting his instruments in the meridian are all trial methods, each of them finding a meridian only by a series of continued approximations, consuming time and effort proportionate to the skill of the observer, the accuracy of the knowledge of his time and latitude, and the rapidity of the successive appearance of favorable stars on his meridian.

The method now proposed requires but little practice and less skill to place an instrument in the meridian by one observation only, without any knowledge of the latitude or time except to the nearest five or ten minutes.

The essential idea of this method is to observe two stars of the same, or differing twelve hours in, right ascension, but of different north polar distances, at the instant of their simultaneous passage of our meridian. Now, since our zenith is a point in the plane of our meridian, and since the plane of the declination circle of any two stars of exactly the same, or twelve hours different, right ascensions, is by the diurnal revolution of the earth made to coincide successively from east to west with every terrestrial meridian, it is obvious that we have but to (select and) observe two such stars at the instant that they and our zenith are in the same vertical plane and clamp, and we have our instrument fixed in the plane of its meridian.

To accomplish this simultaneous observation of two such stars with a transit, zenith telescope or theodolite, we attach to the tube of the telescope directly in front of its object-glass a plane mirror, half silvered to admit of direct and reflected vision, with its axis of rotation horizontal, parallel to its plane of reflection and perpendicular to the line of collimation of the telescope. Attached to this axis is a small vertical finding circle for setting this mirror at any desired angle with the collimation line. In form this mirror may be either an elliptical ring with only the quicksilver removed (or the glass also cut away) from its center, or that of the ordinary sextant horizon glass with its silvered half uppermost. This mirror should have its front and back faces perfectly parallel, and be from one-fourth to one-third of an inch thick, so that by having on its front face two fine lines cut at right angles to each other, we can, by making the reflected image of each of these lines coincide with its direct image, adjust its plane of reflection perpendicular to the telescope's collimation line, and thus also find the index error of its finding circle. In this adjustment use the collimating eye-piece.

This method of getting one star of a pair into the telescope field by a single reflection, and the other by direct vision, will work admirably when the stars differ considerably in north polar distances; but when this difference is small and we point on one of the stars direct, it becomes imperative to subject the

other to a double reflection, by using an additional mirror, as in the sextant, or employing the principle embodied in the Steinheil heliotrope. We may, however, avoid this double reflection of either of the stars of such a pair by pointing the telescope on the artificial horizon image of one of them, and thus get the other into the telescopic field by a single reflection.

When the stars of a pair have the same right ascension, we will have them enter the field of the telescope on the same side and move across in the same direction, the faster mover, as it were, chasing the slower, and catching up with it at the instant of their simultaneous passage of the meridian. But with a pair of stars differing twelve hours in right ascension, i. e., one of them culminating *sub polo*, they will enter the telescope field on opposite sides, move across and meet exactly on the meridian. It is hence obvious that a pair whose stars differ 12 hours in right ascension offers the advantageous feature of the sum of their motions to aid the observer in deciding upon the exact instant of their coincidence in the telescope field, whereas with a pair having the same right ascension he has only the difference of its stars' motions to assist him in fixing upon this instant.

But when the catalogues do not offer star pairs culminating at desirable times, of suitable magnitudes and declinations, and of the same or exactly 12 hours different right ascensions, and thus permitting the application of the method in its greatest perfection, we may yet find our meridian most accurately by selecting and observing suitable pairs, the right ascension of whose stars differ but a few minutes from being identical, or exactly 12 hours different. Now the zenith of a position is a point common to all its vertical planes, and since the plane passing through the earth's center and any two stars differing more in declination than in right ascension, is, by the diurnal revolution of the earth, made to coincide successively with one of the vertical planes of every point on the earth's surface, we hence have but to observe two such stars at the instant they and our zenith are in the same vertical plane, and clamp, and we have our instrument in a vertical plane whose deviation in azimuth is determined by, and easily derived from, the north polar distances of the two stars, the difference of their right ascensions, and the co-altitude of one of the stars (or our co-latitude), we can observe the co-altitude of one of the stars at the instant of their coincidence in the telescope field. Having selected a list of such star pairs, we can readily compute a table from which an observer at any known latitude can pick out the azimuthal deviation of his instrument in degrees, minutes and seconds, at the instant two such stars coincide in his telescope field. Or, instead of using the co-latitude, which must then be known, we can use, in the preparation of such a table, the zenith distance of one of the stars; otherwise we may tabulate the hour angle in time (minutes and seconds) of the hinder of the two stars at the instant of their coincidence in the field of the telescope, either for the different altitudes of this star or for the different latitudes.

The method of observing such a pair with the aid of the last named table will be as follows: Having taken care in selecting to have one of the pair a star of such magnitude and position as to be readily identified by a stellar chart or allineation, we set the mirror in front of the object glass, at an angle

with the collimation line equal to one-half of the supplement of the algebraic difference of the north polar distances of the two stars, and bring the more readily identified one of them into the field of view, and follow it till its mate appears there, either meeting, chasing or fleeing from it. We then "pick the beat" of the watch or chronometer, and beginning to count the beats at the instant the stars coincide in the telescope field, follow the hinder star till the moment its "tabular hour angle" expires, and clamp, and our instrument is in the meridian.

A pair of fast-moving stars will give an accurate meridian, yet practically it will in general be found preferable to have one of the pair a star of slow motion, so that it can be readily bisected and followed until the instant its fast-moving mate strikes the middle wire, thus enabling the observer to clamp his instrument at exactly the right time without hesitation or doubt.

If the table gives the hour angle in time of the hinder star at the instant the two stars and our zenith are in the same vertical plane, then their relative right ascensions and positions with reference to the zenith must be as follows, viz: 1. If both stars are on the same side of the zenith then the star having the greater zenith distance must have the smaller right ascension, and this rule holds when one is a zenith star. 2. But if one star is south and the other north of the zenith then either may be in advance, but practically it is preferable that the slow mover "bring up the rear." 3. When a star south of or in the zenith is paired with a sub-polar, then the latter should not be quite twelve hours in advance of the former. 4. If a star north of the zenith has a sub-polar mate, then the upper culminating star should transit the meridian first, if it is the lower culminating star that we are following with the cross thread, and *vice versa*.

But if our table gives the azimuthal deviation, in degrees, minutes and seconds, of our instrument at the instant two such stars coincide in the field of its telescope (its plane of motion being, of course, vertical) then it is a matter of indifference which star precedes, since this angular deviation can be turned off either backward or forward on the horizontal limb of the instrument.

Within the latitudes of the United States the following varieties of pairs will offer, viz:

Class A. Pairs whose stars have the same, or differ but a few minutes, in right ascension. 1. Two circumpolar stars. 2. A circumpolar star and a time star, the latter being either in the zenith or south or north thereof. 3. Two time stars, either one north and one south of the zenith, or both north or both south thereof, or one star in and the other star either north or south of it.

Class B. Pairs, the stars of which differ exactly 12 hours in right ascension, or lack but a few minutes thereof. 1. Two circumpolar stars. 2. A circumpolar star and a time star either in or south or north of the zenith.

With respect to the relative motions of the stars of a pair most important to the observer in deciding upon the exact instant of their coincidence, class B is in general more favorable than class A. And the pair in class B which

furnishes the maximum amounts of azimuthal motions (in opposite directions), and hence most desirable, is a lower culminating circumpolar star and an equatorial star; while with a pair of circumpolars the sum of these motions is a minimum. And of those in class A, a close circumpolar star and an equatorial star gives the greatest difference of motions; while a pair of circumpolars gives the least. When the stars of a pair move in the same direction, and at not very greatly different speeds, they will doubtless be found to cling together in the telescope field a provokingly long time.

As to the frequency of their availability, the pairs of circumpolar stars stand pre-eminent; since they are on our meridian and its visible extension twice in every 24 hours, they are hence doubly more available than the other pairs which transit our meridian but once in that time.

As to the amount of computation required—an element only in those pairs whose stars are not exactly on the same declination circle or its visible extension—when a zenith star is paired with either a south or a north star (at upper or lower culmination), following within a few minutes, the computation is a minimum, for then the difference of the times of the stars transiting our meridian equals the difference of their right ascensions; and the zenith star obviously transits the meridian at the exact moment it and its mate are in the same vertical plane. And when its mate is a close circumpolar star their mean right ascensions will prove all-sufficient because from the slowness of its motion in azimuth the error of assuming the difference of their mean, equal to the difference of their apparent, right ascensions will in general be inappreciable. And it may often occur that the error of assuming this of two stars having nearly the same precession in right ascension will enter the resulting azimuth in so diminutive a form as to be quite allowable, except in a very close work.

If the stars chosen fall in a part of the celestial sphere illuminated by the sun as they transit our meridian, they will require to be of larger magnitudes than such star pairs as, being in the opposite part of the heavens, cross our meridian at night. Especial effort should be made to incorporate the double stars into pairs, from the facility and certainty with which they can be identified in the telescope field.

And again, if tables are available giving the exact right ascensions and declinations of Mars and Jupiter, they may be advantageously paired with suitable stars; and their continuous motion among the stars renders them more available, since they cross successively the declination circle of every star in the heavens. But the use of these planets will necessitate a more accurate knowledge of our time.

Experience has proven that, in reconnaissances, rapidity of execution in finding latitude, time and azimuth, is all-important and in many cases essential to success; and hence methods and instruments which yield a maximum amount of results in a minimum time are in especial demand. Under the contingency, often arising in reconnaissance and exploration, that the latitude is not known and the time only to the nearest five or ten minutes; and when limited in time and facilities, as the reconnoiterer or explorer *per necessitatem* generally is, then this method will be found most acceptable; for it is obvious that by bisecting one of the stars of a pair (of identical right ascension) with

the horizontal thread at the instant the two stars are on the middle vertical thread, and also at this moment noting the face time of the chronometer, that we have the meridian altitude of a star whose declination is known, and hence our latitude, and also the observed time of meridian transit of a star of known right ascension, and hence a chronometer correction, simultaneously with the observation that fixed our instrument in its meridian, the error of our chronometer, and our latitude, we can if desirable proceed at once to the observation of additional stars for a closer time and to test our latitude and azimuth.

A reflecting circle or sextant mounted on an alt-azimuth stand is *per se* (*i. e.* without an additional mirror) the instrument most convenient and ready for finding by this method the meridian, latitude and time for the reconnoiterer, explorer or land surveyor; and it may be found especially serviceable in hydrographic and geographical reconnaissances, whether in the course of an exhaustive survey, or only a flying reconnaissance of a coast or continent.

And from the readiness with which this method places "the transit" and "zenith telescope" in the meridian it will be found useful and may prove acceptable to even the most conservative practical astronomer.

Mr. Lowry finds that the B. A. catalogue offers an abundance of star pairs of suitable magnitudes, declinations and right ascensions. With the mean places of stars brought up to Jan. 0. 1877, between the sidereal times 0h. 07m. and 0h. 57m. he finds 6 pair stars differing less than 3 seconds in right ascension, 4 pairs less than 7 seconds, 7 less than 16 seconds, and 5 less than 29 seconds.

A yet neater method of getting a meridional plane is to select three stars so that stars A and B are of same declination and differ 10 or 15 minutes in right ascension, and star C differing several degrees from them in declination, but with a right ascension equal to one-half of the sum of those of stars A and B. Now observe the coincidence of stars A and C in telescope field and read horizontal circle, and then the coincidence of stars B and C in the field of view and read the horizontal circle, then set the vernier at the point midway between these horizontal circle readings and our telescope is in its meridian.

The President announced that the Council and Trustees had appointed the following Nominating Committee: Horace Davis, J. H. Smythe, S. B. Christy, Wm. Norris and P. B. Cornwall.

Dr. Wozencraft was introduced by Dr. A. B. Stout, and made some remarks on the feasibility of reclaiming the Colorado Desert of California.

REGULAR MEETING, DECEMBER 18TH, 1876.

President in the Chair.

Thirty-seven members present.

Donations to Museum: Large collection of plants from Joseph A. Clark, Mendocino County. From Dr. J. M. Hill, three specimens gold quartz, Calaveras County. From Henry Edwards, one specimen of jade from near Dunedin, New Zealand. From G. A. Treadwell, specimen of chromic iron, Forest Hill, Placer County, Cal. From A. J. Severance, specimen of porphyry, (core of diamond drill,) from 400 feet below the surface, Virginia, Nevada.

Tribulus from the Eastern Shore of the Gulf of California.

BY DR. A. KELLOGG.

Mr. Wm. J. Fisher collected the following very ornamental *Tribulus* from the eastern shore of the Gulf of California.

Tribulus Fisheri. K.

Stem annual, erect, branching from the base, the spreading stems again more or less branching at the top, somewhat nodose, striate, more or less hispid throughout, chiefly at the nodes, and $1\frac{1}{2}$ feet high; leaves alternate, only the uppermost cauline and ramose, opposite, lower pinnae largest, leaflets 6-8 or 9 pairs, oblong, subacute, submucronate, 4-6 or 7-lines long, oblique—one or more strong lateral nerves—hispid beneath, margins entire or subserrulate; stipules linear-subulate; peduncles thickened upwards, longer than the leaves, 1-3 inches long, axillary, or opposite the leaf; sepals 5-6, colored, narrowly lanceolate, acuminate, margins scarious, very bristly-hirsute on the back, less than half the length of the petals, or about 5-lines; flowers orange yellow, $2\frac{1}{4}$ inches diameter, petals five, obovate, obtuse, subcuneate, 13-lines long, 10-11 broad; style long, 3-4 times the length of the carpels and longer than the stamens, clavate, strongly 10-striate; carpels ten, 1-seeded, in a whirl around the base of the style, indehiscent, but readily deciduous at maturity from the elongated toroid style, obliquely triangular, laterally wedge-compressed, outer edge thickened, gibbous below base, and truncate, beak obsolete, pitted in two rows on the sides, crested on the back with five blunt, stout, mureoid tubercles, carpels scarcely more than a line high. Highly ornamental plant.

It is worthy of note that among Mr. Fisher's collection from Rattlesnake Island, harbor of San Diego, April, 1876, are also specimens of a variety of

Pectis papposa, Gray, which very much abounds in large dotted glands throughout, especially on the leaves (1-2 inches long, $\frac{1}{8}$ -line wide), mucronate, often slightly connate at base—opposite lower branches and similar portion of the stem purplish—slender peduncles enlarged near the base of the heads, sulcate corresponding to the 6-9 involueral scales which are dotted with 1-2 large glands on the back at the tips, margins involuted, but not scarious, infolding the ray akenes in their channels. These rigid, yellowish-green scales are rounded abruptly at the base and laterally attached; orange rays same in number, but longer, their akenes without pappus, or only a very minute united scaly crown; pappus of the disk of 20-25, tawny, rather long, unequal barbellate bristles similarly cohering.

An exceedingly beautiful and delicate pink-purple morning-glory, brought by Mr. Wm. J. Fisher from Ajiabampo, of the Gulf of California, has very handsomely radiated leaves, adding a new glory to these very beautiful twiners. We, therefore, propose to name it

Ipomœa radiatifolia. K.

Stem slender, twining or creeping, 2-4 or more feet high, glabrous, somewhat petangular, fistulous; leaves alternate, or more rarely opposite, pedately 5-12-parted, lobes linear, filiform, mucronate, margins thickened and entire, lateral lobes subdivided into 2-4 outer lesser lobes (giving the leaves a delicate, airy, rounded, radiating outline), petioles slender, $1\frac{1}{4}$ inches long (or shorter than the longest middle, and distinct lobe), mucronate (no stipules); peduncles 1-flowered, axillary, 2-3 inches long, articulated $\frac{1}{4}$ -inch or more below the calyx, bibracteolate at the insertion of the pedicel, bracteoles minute, subulate, scabrous at the joint; calyx 5-sepaled, equal, naked, narrowly lanceolate-linear, acuminate, thin, 3-nerved, margins scarious, subentire; corolla purplish-pink, broadly funnel-form, 1-2 inches diameter, tube gradually enlarging to the throat of the widely expanded campanulate border; stamens and style included, unequal, filaments hirsute to the oblong saggitate anthers (scales none), style long, glabrous, stigma 2-lobed, semicircularly fan-shaped, often subdivided into minute lamellary lobules, minutely villous; Root and mature fruit unknown; embryo 2-celled, smooth.

Pacific Coast Lepidoptera, No. 22.—Notes on some Diurnal Lepidoptera, with descriptions of new varieties.

BY HENRY EDWARDS.

Mr. W. H. Edwards, of Coalburgh, West Virginia, has in view the speedy publication of a complete check list of North American butterflies, and it has been suggested by him that all facts connected with the group known to observers in different parts of the region comprised by the work, should at once be published, so as to bring together such information as may, if deemed worthy, be incorporated in the more important publication. With this view I have made the following notes on some doubtful or little-known species, at the same time calling attention to such strongly marked varieties of some of

our butterflies as seem to me worthy of special note. In these days of doubt as to the "origin of species," every trifling fact which can shed light on so important a field of inquiry becomes of striking value, and it appears to me necessary for all varieties which are apparently permanent to bear a distinguishing name, so that they may at once be recognized and hold their proper place in our nomenclature. The following remarks will be, therefore, taken at their true value, as I by no means claim that all of the forms described in this paper should rank as distinct species, though future observations may possibly elevate some of them to that position.

Parnassius Clodius. Menetries.

This species, like all of its genus, is liable to great variations, and there is little doubt that some of its extreme forms have been described under other names. Indeed, I am conscious of having unwittingly led Mr. W. H. Edwards into the error of believing that our forms represented *Clodius*, Menetr., and *Clarius*, Evers., and on my authority he has figured them as such in his "Butterflies of North America." Subsequent observations, however, led me to the conclusion that we had but one species, and the capture of some sixty or seventy specimens in Bear Valley in 1873, gave me a long series of intergrades, in which both of the forms above alluded to were certainly included, and with the knowledge that *Smintheus* and *Behrii* were but variations of one species, I could do no other than acknowledge the incorrectness of my former opinion. Dr. Boisduval appears also to have once been led into the same error, and afterward to have rectified it, as he leaves *Clarius* out of the list of species in his "Lepid. Calif., 1869." The clearness of the white ground, the size of the colored spots, and the presence or absence of the red basal patches of the under side, do not appear to constitute permanent characters, though at first sight they would seem to indicate distinct specific relations, while the size of the insect and the intensity of the colored patches seem to be modifications resulting probably from various altitudes, those of the less elevated regions being usually most pronounced in color. It should be remembered that *Clarius* was described by Eversman from specimens taken in the Altai Mountains, Siberia, and, on the high authority of Mr. H. W. Bates, our "Californian specimens do not resemble at all *Clarius* of the Altai," so that we have to blame Boisduval for introducing that species into our lists, instead of alluding to our extreme variations (as has been done in the case of *Behrii*) by a new name. That they are worthy of such distinction there can be no doubt, and I propose for perhaps the widest range of variety the following name, the specimens from which the description is taken being in my own collection. It must be borne in mind that this variety wanders considerably farther from the type than that figured by Mr. Edwards as *P. Clarius*, Evers.:

Parnassius Menetriesii. Hy. Edw. n. var. of *Clodius*. Menetr.

Imago ♂. Smaller than the typical forms of *Clodius*. Ground color of wings, sordid white; semi-transparent margin rather narrow, with the white lunules indistinct; the whole of the black marks of primaries are fainter than in *Clodius*, and there is no black spot in the submedian interspace. The sec-

ondaries have the abdominal margin comparatively more deeply edged with black, the line being distinctly bent inwardly toward the extremity of the cell; the colored spots are very small, almost obsolete, becoming simply pale pinkish or yellowish dots, surrounded by a narrow black ring. Under side vitreous, with a yellower tinge than above; all the marks fainter, except the colored spots of the secondaries, which are here, though small, distinct in color, and have white pupils. There is also a faint indication of a black bar on the anal angle, but no trace whatever of crimson basal patches. Head, thorax and abdomen beneath densely clothed with deep yellow hair, much darker and a more brilliant tint than in the typical form.

Exp. of wings, 2.25 inch.

♀. In nearly all respects this sex of the present variety resembles the ♂ of the type, and would at first sight be certainly so regarded. The transparent space of primaries is much smaller than usual; the bands are narrower and less defined, so that the white area of the wing is nearly as large as that of the male insects. The black patch in the submedian interspace is rather large, and the veins more sharply marked throughout. The secondaries have the colored spots small, but distinct in color, mostly pale crimson or orange, and surrounded by a black ring. The abdominal margin is only faintly black, and there is a trace of a black bar at the anal angle, which is, however, entirely without red. Under side similar to the upper in the black markings; the colored spots of secondaries are bright in color, and in some specimens there are two basal red patches, the anal bar more distinct than above, but without red. There is a seam of yellow hair along the abdominal margin, surmounted by yellow scales, a character which I do not find in my typical specimens of *Clodius*, and the yellow hair of the thorax and abdomen are almost golden in their tint.

Exp. of wings, 2.50 inch.

Bear Valley, Sierra Nevada (Hy. Edw.), Lake Tahoe (Hy. Edw.), Downieville, Cal. (Dr. Behr), Mt. Nebo, Utah (I. D. Putnam).

Parnassius Smintheus. Dby. Var. *Behrii*. Edw.

I have two specimens of this insect in my collection, one taken by Mr. J. Hutchings, of Yosemite, on the top of Mt. Dana, Cal., at an elevation of 10,000 feet, and the other by Mr. I. D. Putnam, in Summit Cañon, Utah. It is somewhat singular that the typical form of *Smintheus* never occurs in California, while the variety should be found here. Both of my specimens have the spots orange, and the double row of marginal lunules on the secondaries so characteristic of this strongly marked form.

Pieris venosa. Scud.

Perhaps there is no group so puzzling to an entomologist as that of the genus *Pieris*, to which this species and its allies belong, and the number of names which we find in our catalogues are the natural outgrowth of the widely different variations which we find in collections. Our Pacific Coast species rather tend to increase the confusion than otherwise, and in the separate opinions which exist as to their specific rank the complication becomes more and more intri-

cate and unsatisfactory. In *Lepid. Heteroc. et Rhopt.*, No. 8, Mr. H. Strecker has advanced the idea that *P. venosa* and *P. castoria*, Reakt., are one and the same thing, and that they are simply the American forms of the European *P. Napi*, and I can, after an examination of many scores of specimens, but simply endorse his views. That *venosa* and *pallida*, Scud., = *castoria*, Reakt., are at times represented by widely differing varieties no one can deny, and if we take the extreme forms we should naturally regard them as distinct species; but intergrades may always be found, and among these intergrades we find what Scudder designated as *pallida*, which more nearly approaches Reakirt's type of *castoria* than it does that of Scudder's *venosa*. But the insects are not, as has been suggested, spring and summer generations, as they are both found together, appearing in early spring (sometimes in February), and continue on the wing until the end of April or the beginning of May, when they begin to die out. But admitting *P. venosa* and *P. pallida* to be forms of the same species, what becomes of *P. oleracea*? Among my specimens captured during the present year, as well as others taken in Colorado, Oregon, Vancouver Island, and Northern California, are some which continue the series of intergrades until they are merged into the exact counterparts of the Atlantic species of *P. oleracea*, and cannot be in any way distinguished from the well known species of the Eastern States. Is *P. oleracea*, then, but another form of a trimorphic or polymorphic species? Then, again, many of the individuals of *P. pallida* approach very closely (so closely as to suggest the very nearest relation), others of *P. Rapæ*, and the form described by Mr. Scudder as *P. marginalis*, and afterwards by Mr. Reakirt as *P. Yreka*, can sometimes scarcely be distinguished from the varieties of *pallida*, upon which Reakirt founded his *castoria*. Do not, then, our American examples serve very powerfully to prove the common origin of all these forms, and show that we have hitherto attached too much value to what is designated a species, believing certain characters to be permanent, when, in fact, they are so only under the light of our limited knowledge? To illustrate more clearly my meaning, let us take a strongly marked and darkly colored specimen of *P. venosa* as our starting point, and we shall pass through the various stages thus, our insects becoming paler, and with the markings less pronounced, as we proceed.

1. *P. venosa*. Scud. Veins of underside of secondaries, broadly bordered with black scales; the lines of equal width to the margin of the wings.
2. " " Veins narrowing at the margin, with the ground color of the wings more yellow.
3. *Hulda*. Edw. Veins with their accompanying black scales, sometimes becoming confused, and spread over the whole surface; the lines of scales being sometimes quite indistinct, at others well marked and approaching the following:
4. *Napi*. L.
(Germany.) Surface of secondaries, yellow, with the nerves bordered by black scales, the lines being narrower as they near the margin.

5. *frigida*. Scud. Like *Napi*, but with the whole of the lines a little narrower and fainter.
6. *Napi*. Lines all very faint, almost obsolete as they approach the margin.
(Colorado.)
7. *Napi*. Lines still fainter, quite obsolete at the margin, with the ground color of the wings still yellow.
(Massachusetts.)
8. *pallida*. Scud. Ground color usually white, sometimes pale yellow, with the lines bordering the nervules, very faint or quite obsolete, passing by many gradations into the following:
=*castoria*. Reak.
- P. oleracea*. Veins without margins of scales, surface white or pale yellow.

We may pursue this still farther, until we arrive at a form of *oleracea* almost pure white, in which even the nervules themselves are scarcely to be traced by any definite color. But the subject may perhaps be better illustrated by retracing our steps, this time starting with *oleracea*, and endeavoring to show its relationship to *P. Rapæ*.

1. *P. oleracea*. Almost pure white, with faint yellowish tinge beneath. ♂ without spots.
2. " White, with very faint indications of spots on the primaries.
(Oreg. and N. Cal.)
3. *Castoria*. Reak. White, with faint yellowish tinge. ♂ with faint spots on the primaries.
4. *Marginalis*. Scud. White above, yellow beneath on secondaries. ♂ with distinct spots on primaries, and with the apex slightly dusky.
5. *Ergani*. ♂ with the apex more broadly dusky, and with the spots on primaries well defined.
(Europe.)
6. *Rapæ*. L. Apices broadly dusky. Spots very distinct and well defined. Underside of secondaries, white, greenish white to yellow.
7. *Novangliæ*. Scud. Upper and lower surfaces yellow, spots and apices as in *Rapæ*.

Thus it will be seen, that according to my views, two branches of variation have proceeded from the one original source, though what that original source may be we are at a loss to tell, and that the most special characters distinguishing these two branches belong to *P. Pallida*, which in many respects resembles *P. Rapæ* as much as it does *P. Napi*. I am aware that there are other points of difference between the extremes of these insects, but certainly none more remarkable than between the darkly veined specimen of *P. venosa*, and the almost immaculate and veinless examples of *P. Pallida*.

Breeding the caterpillars through successive generations, will alone lead us to the truth, and unhappily at present we know but little of the earlier stages of these creatures. The present remarks must therefore be taken as a suggestion rather than the dogmatic statement of a fact.

Pieris calyce. W. H. Edw.

I am inclined, from the examination of a specimen in Dr. Behr's collection, to believe that this is the Spring generation of *P. occidentalis*. Dr. Behr's specimen was taken by Mr. R. H. Stretch, in April, in Carson Valley, Nev., and mine, from which the original description was made, and which is now in the possession of Mr. W. H. Edwards, was caught by myself near Reno, Nev. in the end of March. *P. occidentalis* occurs in the same localities in May, June and July.

P. Beckeri. W. H. Edw.

This species is said by Mr. Strecker and others to be identical with the Russian *P. Chlorodice*, Hb., differing only by its larger size. In support of this opinion, I may state that in my collection are two specimens (♂) from the Coast Range in Mendocino County, measuring only 1.50 inch in expanse, while those from Virginia City are over 2.00 inches; the smaller examples in no other respect differing from the Nevada specimens.

Nathalis Iole. Bois.

This pretty little species, as well as the var. *N. Irene*, Fitch, must be included in the list of Pacific Coast Butterflies, having been taken in some abundance near San Diego by the late G. R. Crotch, G. W. Dunn and others. It is extremely abundant near Cape St. Lucas, and in various portions of the country on the eastern side of the Gulf of California.

Anthocaris Creusa. Dby.

I have little doubt, from an examination of a figure by Mr. Butler of the British Museum, kindly loaned to me by Mr. W. H. Edwards, that this species is the same as *A. Hyantis*, Edw., which is well known to occur in the Sierra Nevada, and in other high lands in this State. It is said by Dr. Behr to be far from rare in the neighborhood of Oroville, and has been taken recently by Baron d'Osten Sacken in the Yosemite Valley, and by myself near Lake Tahoe. It is probably often confounded with *A. Ausoniedes*, but is abundantly distinct.

Anthocaris olympia. Edw.

This exquisite species exists in my collection from Colorado, near the Utah border, where it was taken by Mr. Winslow Howard.

Anthocaris Reakirtii. Edw.

I think I am wholly to blame if this should turn out, as I now suspect it to be, only a form of *Sara*, Bdv., as it was entirely through my statements that Mr. W. H. Edwards erected it to the rank of a species. The main points of difference are the smaller size, the irrorations of the costa, the straight line enclosing the orange apical spot, and the white females. But I find of late years, that these characters are by no means permanent, and that all gradations may be found. It is most probable, therefore, that *Reakirtii* is the

spring generation, and *Sara* that of the summer. The former appears very early in March, and the latter in May and June. The ♀♀ of *Reakirtii* are at times, though only rarely, as yellow as those of *Sara*, and the irrorations upon the costa are as frequent in the latter as in the former.

Anthocaris lanceolata. Bdv. = *A. Edwardsii*. Behr.

In most of the males I have seen, the apices are only very slightly clouded with dusky scales, but in two specimens taken in Kern County by Mr. R. H. Stretch, they are broadly and distinctly clouded, thus more closely resembling the other sex.

Callidryas eubule. L.

Examples of this species, of both sexes, were taken in San Diego, in August, 1875, by Mrs. James Behrens, flying about the streets of the city, and settling upon the flowers of the gardens. I have since received other specimens from Mr. G. Hitchcock, of San Diego.

Colias eurydice. Bdv.

Between the spring and autumn generations of this beautiful insect a great variation occurs, which is quite constant in all the examples which have come under my notice. In the spring specimens, which may be regarded as the type, and which make their appearance in April and May, the secondaries of the ♂ are wholly bright orange, without any spots or marks upon the margin, except some brown dots to note the termination of the nervures, while the ♀ is, with the exception of the large discal spot of the primaries, and a very faint brown marginal line, quite immaculate. The autumn brood, however, appearing in July and August, have the secondaries of the ♂♂ with a black marginal border, sometimes one and one-half or two lines in width, and the ♀♀ have the margins distinctly marked with brownish patches, and occasionally (though rarely) with a black submedian band, composed of clouded patches, interrupted by the nervules, reaching from the costa to the interior margin. If deemed worthy of a name, I should propose for this strongly marked form that of

C. eurydice. Var. *Amorphæ*. Hy Edw.

I have recently received from Mr. O. Barron, of Mendocino County, a magnificent variety of this species, in which the whole of the yellow space of the primaries (which usually bears the name of the "dog's head") is suffused with the richest purple, the orange being only slightly visible beneath it, thus giving the insect a most striking appearance.

Terias Nicippe. Cram.

Taken in Kern County, by Mr. R. H. Stretch, and by Mr. Dunn and others, near San Diego.

Terias Mexicana.

Taken in the neighborhood of San Diego by Miss Marcia Crane, and near San Bernardino by the late G. R. Crotch.

Euptoieta Hegesia. Cram.

This species is very common in Lower California, and occasionally wanders over the border into this State. I have received specimens taken undoubtedly within our limits, but it must at present be regarded as a rarity.

Agraulis Vanilla. L.

Very abundant in the gardens of San Diego in August and September. (Mrs. Jas. Behrens.)

Argynnis Liliانا, n. sp. Hy. Edw.

I am unwilling to add another to the already long list of *Argynnis*, but can see no other way out of the difficulty which is presented to me by some specimens taken by me in Napa County. I have, however, much pleasure in dedicating what I believe to be a true species, to my friend, Mrs. Lillie Coit, who has added many great rarities to my collection, and at whose country residence, in one of the most charming portions of the State, the species seems to have made its home. It is intermediate between *A. Calippe*, Bdv., and *A. coronis*, Behr., partaking of the characters of both, yet I think distinct in the following details:

It is darker in color of the upper side than *A. coronis*, and very much darker than *A. calippe*, being of a rich reddish brown. The markings above similar to those of these two species. Beneath, the primaries are largely suffused with reddish brown, as in *coronis*, but the remainder of the wing is occupied by bright buff, not dull ochreous as in *coronis*. The silver spots of the margin are very decidedly triangular, and not ovate as are the apical ones of *coronis*. On the lower wings the differences are more apparent. The silver spots are larger proportionally than in any other species with which I am acquainted, while the sheen of the silver is exceedingly vivid and intense. The marginal spots are quite triangular, and the large one of the cell more decidedly oblong than either in *A. coronis* or *A. calippe*. The ground color of the wing is bright buff, inclining to orange; much the same color as in *A. rupestris*, and by no means brown as in *A. coronis* and *A. calippe*, thus giving a brighter and more lively appearance to the whole of the underside.

Without forming a *positive* conclusion as to its value as a species, I think this form well worthy of a separate name. I have taken it for three seasons past near St. Helena, Napa Co., and altogether have had before me thirty-four ♂ and seven ♀, all of which are true to their own type, presenting among themselves little or no variation. When placed side by side with long series of the closely allied species, this insect presents at once so great a difference as to strike the observer, being quite as complete as that between *A. coronis* and *A. pervadensis*. The actual position of many of our *Argynnis* as species, can only be determined, however, by watching the insects through their various stages.

Argynnis monticola. Behr. Var. *purpurascens*. Hy. Edw.

Under this name I wish to recognize the form of *Arg. monticola*, which is found chiefly in Siskiyou County, in the region surrounding Mt. Shasta, as

well as in some parts of Oregon. It differs from the type, by the larger amount of black on the upper surface, visible in both sexes, by the smaller size, and by the more suffused appearance of the lower side. The spots are somewhat larger proportionally than in the type, in this respect resembling *Zerene*. Behr, and the basal half of the secondaries is much darker in color, while the margins of all the spots are larger and more intense. The whole of the underside is also tinted with a purplish efflorescence, very visible in fresh specimens. The female is always deeply suffused with black on the lower side, and almost invariably has the spots either partially or wholly silvered, a character not observable in the typical *monticola*. This beautiful variety was first taken by Mr. W. G. W. Harford, at the Dalles, Oregon, and subsequently by Mr. J. Behrens at Soda Springs, Siskiyou County, in which last named locality I took about forty specimens, all characterized as mentioned above, in the fall of 1875. It closely connects *A. monticola* with *A. Zerene*, and may have been under Dr. Boisduval's eye when he confounded these two species.

Argynnis myrina.

Though not found in California or Oregon, this species was taken in abundance near Sitka, Alaska, by the late Mr. Bischoff. The specimens are smaller than those of the Eastern States, and the whole of the underside brighter in color, with the silver spots proportionally of a larger size.

Melitæa Leanira. Bdv. Var. *Obsoleta.* Hy. Edw.

Near San Rafael, in Marin County, I annually take specimens of a very curious variety of *M. Leanira*, so constant in its characters as to suggest the idea of a new species. In the lower side of the typical form, the secondaries are marked with black blotches near the base, and a double submedian band inclosing a series of seven spots of the pale ochraceous color of the ground. In the variety *obsoleta* these marks are all obliterated, and nothing appears but the black nervules and a slight black marginal line. In all other respects the insect agrees with the typical form. It is somewhat singular that in the locality in which these varieties are found I never met with the true *Leanira*, which is always a very local insect, and that, although I know several localities in which *Leanira* is found, it is only in the one mentioned above that I ever met with the var. *obsoleta*.

Pyrameis. Hybrid between *P. Caryæ* and *P. Atalanta*.

Hybrids among diurnal Lepidoptera are very rare, and the present is a very interesting form, worthy of record. It was raised by Dr. H. Behr from a caterpillar found feeding on nettles (*urtica*) at Lagunitas, Marin County, in July, 1876. The perfect insect appeared in August. It presents a very singular conjunction of the characters of the two species, of which it is undoubtedly a hybrid. The spots across the primaries form a bent macular band, the sub-apical spot being red and not white as in *Atalanta*, the base of the wing behind the band being rusty red. The secondaries are blackish nearly over

the whole surface, with reddish hairs, which are longest toward the base; the submarginal row of ocelli similar to those of *caryæ*, only with white pupils. The under side is that of *Atalanta*, the abdomen being neither black nor red, but brownish, the color of the anal margin of the hind wings. Altogether it is a very remarkable production of the two species, and should be figured, so that such an interesting hybrid may not be lost.

Limenitis Lorquini. Bdv.

In all the specimens I have received from Vancouver Island, the ground color of the under side has a purple tint in place of the snuff-brown of the usual form, and in two specimens received from near Virginia City, Nevada, taken by Mr. W. Eaves, I note more remarkable changes. On the upper side the white macular band is very narrow, and is edged on the secondaries posteriorly by a very distinct row of ovate orange spots, reaching quite to the costa, while inside the ochreous apical patch of the primaries, and beneath the outer band of three white spots, which is peculiar to the species, there is a duplex spot also of orange. Beneath, the wings have considerably more white than the type, and the basal spots of the secondaries are clear white and oblong in shape. I desire to record this well-marked variety by the name of *Limenitis Lorquini*. Var. *Eavesii*. Hy. Edw.

Coenonympha Eryngii. n. var. Hy. Edw.

Under this name I wish to recognize a remarkable form of *C. californica*, taken by me in considerable numbers at Soda Springs, Siskiyou County, in the fall of 1875. The upper side is exactly that of *C. californica*, var. *galactina*, wanting the black or dusky hairs at the base of the wings, the thorax and abdomen being concolorous. The under side is characterised by the usual straight band on the primaries and the waved or dentate line of the secondaries, but there is an utter absence of points, spots or ocelli, in this respect closely approaching the ornamentation of *C. inornata*. I took this insect only in one locality, flying about the beautiful *Eryngium petiolatum*, Hook, which here attains a large size, and a most brilliant bluish color.

Size of *C. californica*. Soda Springs, Siskiyou County, Cal. Hy. Edw., August. (11 ♂; 9 ♀; Coll. Hy. Edw.)

Thecla sœpium. n. var. *fulvescens*. Hy. Edw.

A very strongly marked variety of *T. sœpium* occurs rarely throughout the State. It is usually smaller than the type, and very much paler in color, being occasionally of a golden brown instead of chestnut tint. The fringes are whiter than in *T. sœpium*, the under side much fainter in color, with the markings less pronounced, and the submarginal band always more distinctly edged with white. It may prove ultimately to be a new species, but for the present I prefer to regard it as a variety of the common form alluded to.

Lake Tahoe, Hy. Edw. Tehachepi Pass, R. H. Stretch. Havilah, Kern County, R. H. Stretch. (2 ♂; 2 ♀; Coll. Hy. Edw.)

Thecla melinus. Var. *pudica*. n. var. Hy. Edw.

I have before me two specimens (♂ ♀) of an insect which at first sight appeared to me a new species, but which I now think can only be considered a

variety of *T. melinus*, Bdv. It is considerably smaller than *melinus*, being only 0.90 inch in expanse, while *melinus* measures 1.25 to 1.30 inch. The upper side is similar to that of *melinus*, but the lower side is more silvery gray, with the markings in the primaries utterly obliterated, and a distinct black line at the base of the fringe. The markings of the secondaries are similar in outline to those of *melinus*, but they are extremely faint, and the anal orange spot is almost obsolete, while the red bordering to the submarginal band, so conspicuous in *melinus*, is here reduced to a few scattered scales.

Contra Costa County. Hy. Edwards. June, 1875.

Perhaps a long series of specimens will show the identity of *T. melinus*, Bdv., and *T. humuli*, Harr., but in all the examples I have seen of the latter, I miss the red scales bordering the submarginal band above alluded to. But beyond this, I see no character by which they can be separated.

Lycæna speciosa, n. sp. Hy. Edw.

Pale silvery blue, the color of *L. mellisa*, Edw. Fringes, very broad, clear white, cut very distinctly by black at the ends of the nervules. Underside, pale silvery gray, with a very minute round black spot on the costa, and a series of five round sub-marginal and one oblong central spots arranged almost in circular form on the disc. There is also a distinct oblong discal spot, and a smaller round one on the internal margin. The whole of the spots on the primaries are comparatively large, very distinct, and jet black, without white margins. The secondaries have one basal dot, a minute discal point, and a sub-marginal row of seven small black spots, also without white margins. Fringes, as in the upper side. Anterior, with the club unusually large, and the shafts distinctly annulated with white. Thorax and abdomen, blackish above, silvery beneath.

Exp. of wings, 0.70 inches.

Havilah, Kern County, R. H. Stretch. (1 ♂ Coll., Hy. Edw.)

I should have hesitated to describe this exquisite species from a single specimen, but the peculiar arrangement of the spots on the lower side of the primaries, its extremely small size, and the broad and distinctly black and white fringes serve abundantly to distinguish it from any other form with which I am acquainted.

N. B. As I intend to devote a separate article to the species of *Colias* proper, I have omitted all reference to that genus in the present paper.

Professor Davidson read a continuation of his papers on Irrigation, describing the canal Cavour.

The Committee on Nomination submitted the following report:

The Committee appointed to present a ticket of officers to the Academy to be voted for at the coming election, beg to offer the

following report. They have carefully considered the responsible duty assigned to them, and have unanimously resolved to recommend to the Academy the re-election of the present officers and Trustees. They were led to this conclusion by a consideration of the unsettled condition of the temporalities of the Academy. Many matters of grave importance, and at the same time affairs of a complicated and delicate nature have often been under consideration at the joint meetings of the Council and Board of Trustees, and it seemed to them only ordinary prudence to continue these gentlemen in office. We therefore recommend the following ticket:

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(Signed,)

Horace Davis, Wm. Norris, J. H. Smythe, P. B. Cornwall,
S. P. Christy.

On motion, Dr. A. Kellogg and S. P. Christy were appointed Inspectors, and Chas. Wolcott Brooks and Henry Chapman Judges of Election.

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